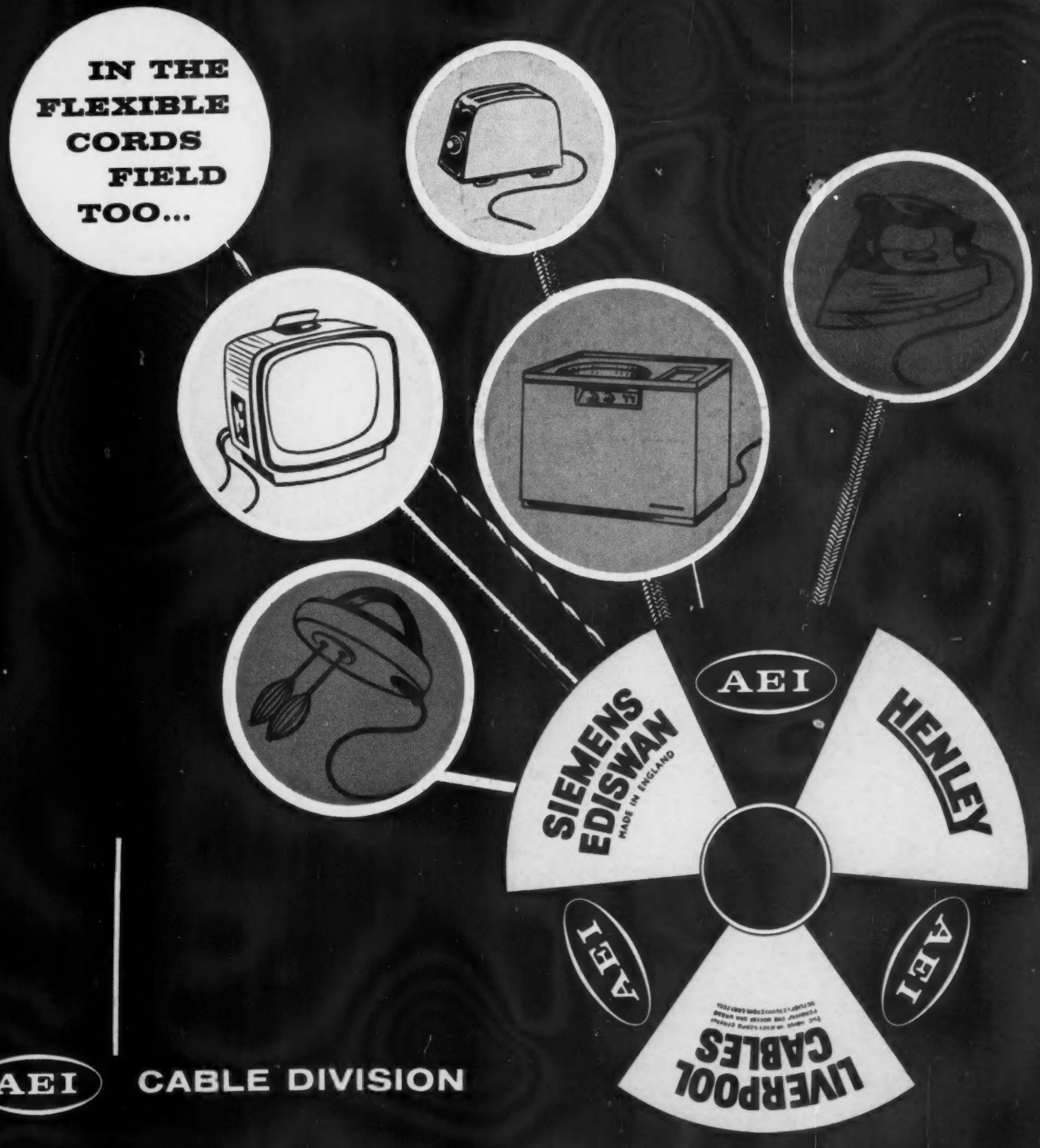
ELECTRICAL TIMES

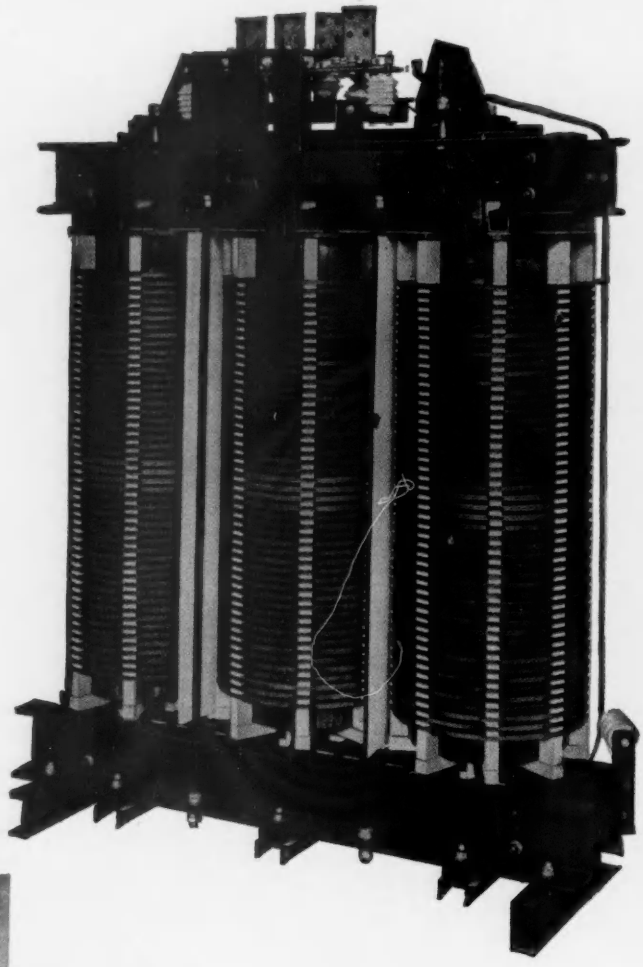


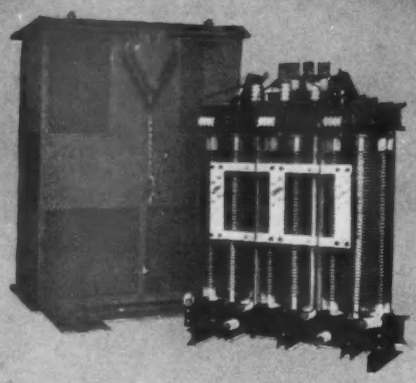
AEI CABLE DIVISION

BRYCE

DRY TYPE AIR COOLED CLASS-C TRANSFORMERS

SILICONE INSULATION SILICONE INSULATION SILICONE INSULATION





SILICONE INSULATION

- No Fire Risk
- Reduced Weight
- Higher Overload Capacity
- Can be installed in damp locations

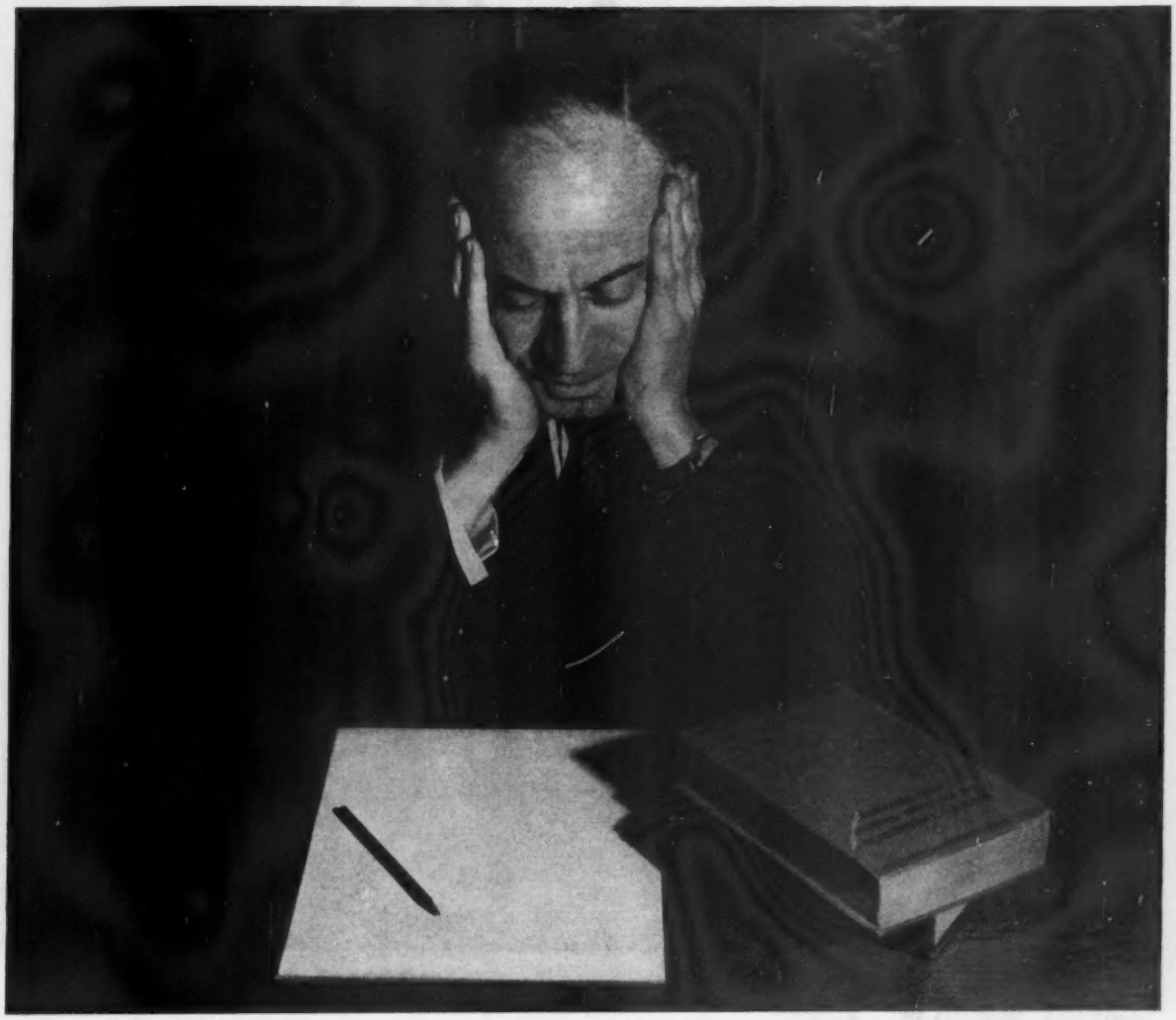
For any installations where fire risk is high or consequential loss would be considerable, the introduction of the dry type air-cooled Class 'C' Transformer marks another major step in security.

Illustrated is a 1,000kVA, 3 phase, 50 cycles, 11,000/433 volts Bryce Low Loss Distribution Transformer using Class 'C' insulation.

BRYCE ELECTRIC CONSTRUCTION CO. LTD.

Kelvin Works, Hackbridge, Surrey. **Telephone Franklin 1101-7**

Broadway/bec 6



Publicity Manager thinks:

"It's no use shutting my eyes to the fact! I shall never write truer copy than:

'L.S.E. are good people for electric motors'

"(*adding, for those who like details in small type.* 'Especially for integrated power equipments involving motors, associated machines and control apparatus, from one to several thousands of horse-power')"

LAURENCE, SCOTT & ELECTROMOTORS LTD.

ELECTRICAL ENGINEERS SINCE 1883

NORWICH & BRANCHES

progress & efficiency

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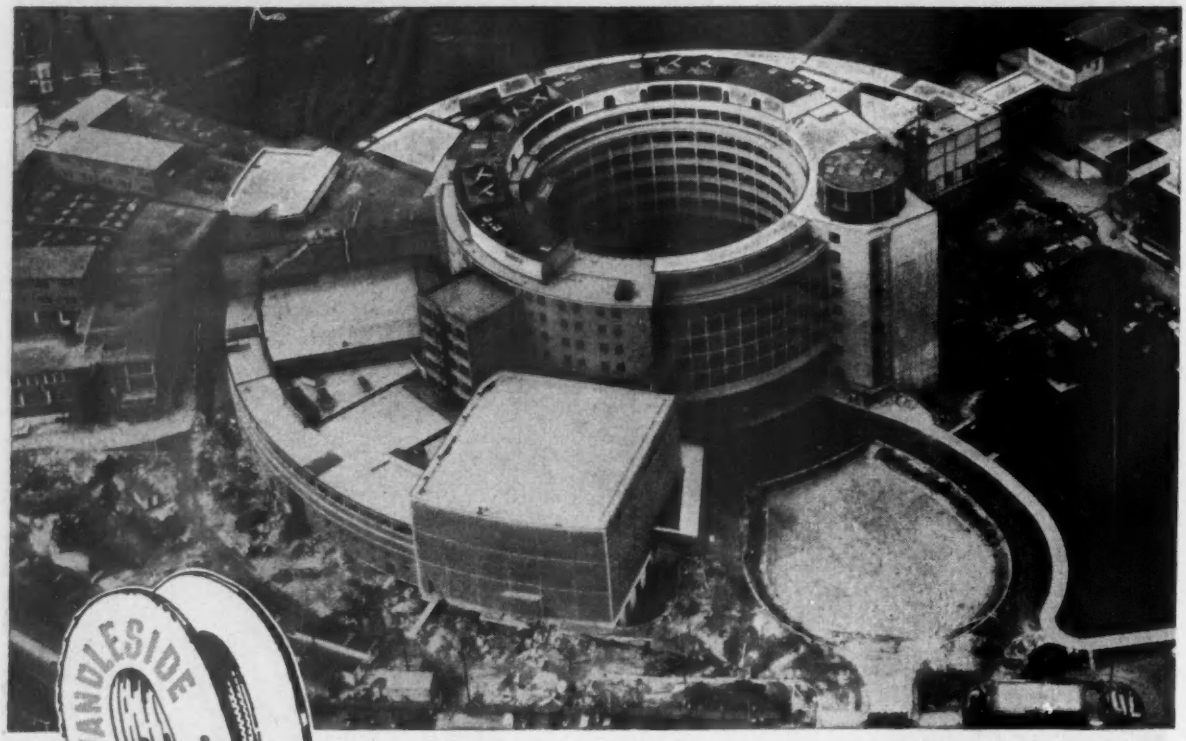
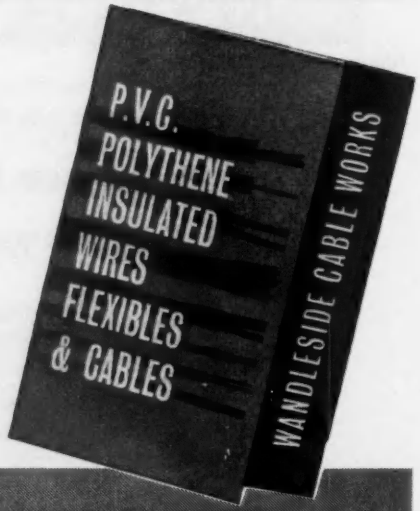
WANDLESIDE CABLES



The new B.B.C. Television centre uses Wandleside Cables.
[Photograph by courtesy of the B.B.C.]

Every type of cable produced in the three factories of the Wandleside Cable Group is subjected to the most exacting tests to comply with the British Standard. Government or other relevant Specification. Reliability is our watchword. This is why you will find Wandleside Cables carrying the load in every major project in the Television, Radio, Electrical, Electronic and Aircraft Industries.

Our new catalogue gives you details and specifications of our range of Thermoplastic Insulated Wires and Flexibles.
We will gladly send you a copy by return of post.



WANDLESIDE CABLES for Radio and Television

WANDLESIDE CABLE WORKS LTD. · 106 GARRATT LANE · WANDSWORTH · LONDON · S.W.18
Tel. VANdyke 7544 (7 lines) (in FALKS Group) Teleg: Wandleside, London

Medium-size a.c. motors

FROM STOCK

IMMEDIATE DELIVERY

is offered of all the following foot-mounted induction motors. The ratings listed are for 400/440 volt, 3-phase, 50-cycle supplies.

SQUIRREL CAGE (BS 2613)			
Screen-protected		Totally enclosed fan-cooled	
h.p.	*speed r.p.m.*	*h.p.*	*speed r.p.m.*
30	970	25	730
30	725	40	975
50	1460	40	730
50	725	50	1475
*55	720	50	730
70	720	65	1475
*75	970	†65	1475
100	1455	†65	975
100	725	†85	950
*125	1465	100	1480
*130	970	†100	1450

SLIPRING (BS 2613)	
Screen-protected	
h.p.	*speed r.p.m.*
30	965
50	1450

**drip-proof enclosure*

† *totally-enclosed closed air circuit motors, radiator cooled.*

For further details of these and other AEI stock motor ranges, please contact your local AEI district office or Industrial Machines Dept., Mosley Road Works, Trafford Park, Manchester 17. Telephone No. Trafford Park 2431. Extension 1212.

AEI

Associated Electrical Industries Limited

Motor & Control Gear Division

RUGBY AND MANCHESTER, ENGLAND

COMBINING THE MOTOR & CONTROL GEAR INTERESTS OF BTH AND MV

PLEASE REMEMBER GENEROUSLY WHEN BUYING YOUR POPPY.

A573

Drips are OUT — the NO-DRIP TAP is IN

* *Easily cleaned*
* *Smooth flow*
* *Self-closing or lock open*
* *Seat cup replaceable without tools*
* *Long life trouble free*

All **'Jackson'** Counter Sets are now fitted with the **NO-DRIP BEVERAGE** TAP

TRADE ENQUIRIES WELCOMED

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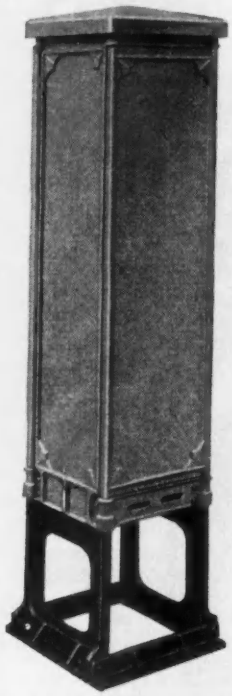
Jackson Boilers Ltd. FULLERTON PARK, ELLAND ROAD, LEEDS 11 Tel: 76673-7

Showrooms: LONDON (Tel: ABBey 6363) · BIRMINGHAM (Tel: CENtral 2720) · GLASGOW (Tel: CENtral 3660)

PILLAR CASINGS



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LARGE AND SMALL

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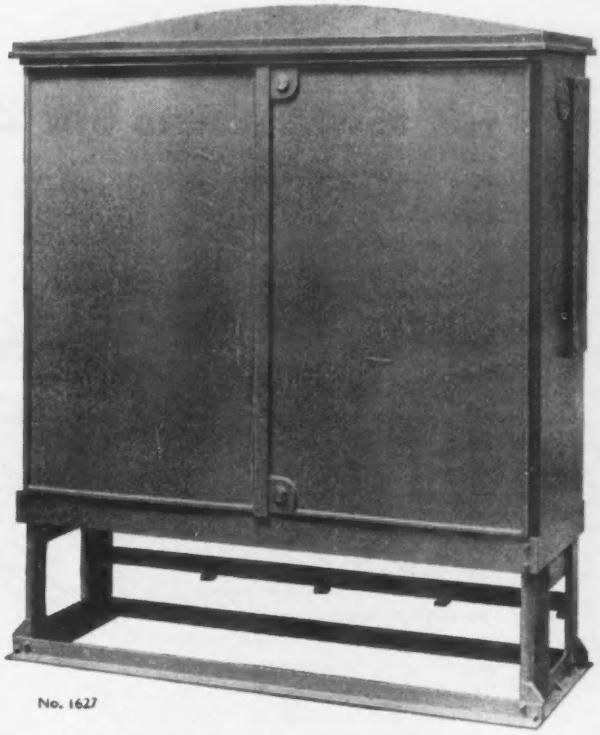

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METER BOARDS ARE BEST!

Here's a trunk call coming through for all meter board users: "Wootton tested boards are extra tough, and combine strength plus reliability under all climatic conditions"—and don't forget WOOTTON wood blocks, sunk switch boxes and instrument cases.

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Telephone: HOWard 1858

THE POWER BEHIND THE GODDESS

The Steel Goddess was the description given recently to the new Durgapur steelworks. This was apt not only because of its immense importance to Indian steel, but also because Durgapur means 'the place of Durga' and Durga is the ten-armed Goddess of Bengal.

The power behind the annual production of one million ingot tons of steel is one of our many responsibilities at Durgapur. The Goddess's heart, the power plant, consists of four Simon-Carves water-tube boilers producing steam for vital steelworks services; the associated fuel and ash handling plants, cooling system and steam distribution network are all Simon-Carves designed and built.

COMPLETE POWER PLANT BY *Simon-Carves Ltd*

STOCKPORT, ENGLAND

and at CALCUTTA · JOHANNESBURG · SYDNEY · TORONTO

At Durgapur we are also building the coke ovens and coke handling plant, the by-product plant, the coal washery, blending and handling plant and the inter-connecting services for gas, tar and steam.

SC 235

Power Costs Effectively Reduced—by HUNTS CAPACITORS

This Hunts Therminol Capacitor Bank for Power Factor Improvement was exhibited at the Electrical Engineers Exhibition.

Specification
950 kVAr 380 volts
3 Phase 50 cycles
Assembled with HRC fused Therminol capacitor units of 25 kVAr

Conditions vary between different areas and from one type of installation to another and you are invited to discuss your electrical power installation with our technical staff. Free advice and if necessary a report and estimate will enable you to judge whether the conditions of power consumption in your plant are needlessly wasteful. Anticipated annual savings sometimes running into many hundreds of pounds will show just how soon the capital outlay is recovered by the increase in electrical efficiency. Thereafter you will enjoy a net saving through reduced electricity costs.

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THE TRADE MARK OF RELIABILITY

We manufacture wide ranges of capacitors for other industrial applications including Phase Splitting, Fluorescent Lighting, Motor Starting and Running, HF and RF Heating, Radio Transmission, Telephone Installations, Ignition and Interference Suppression.

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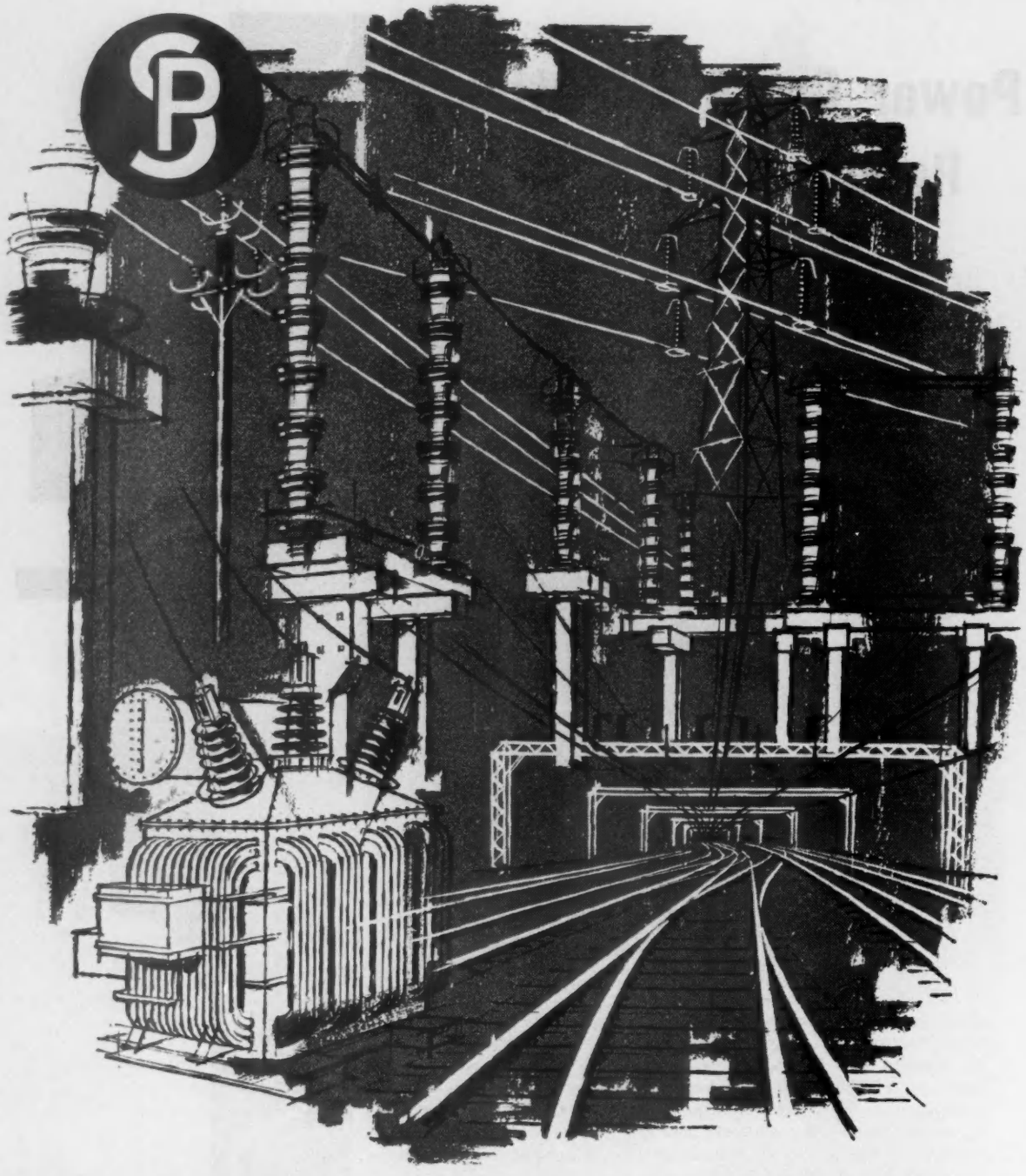
Head Office: Bendon Valley, Garratt Lane, Wandsworth, London, S.W.18
Factories also in Essex, Sussex and North Wales



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The outstanding quality of S & PP insulators is the result of over 30 years' experience in the manufacture of high voltage porcelain insulators.

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FG.51

Electrical Times, 3 November, 1960

RTB

Completed main exciter armature core for a 200 M.W. turbo-generator made by C. A. Parsons & Co. Ltd. for Toronto.

The core of a fine generator– with laminations by RTB

WE SPECIALIZE IN THE FOLLOWING:

LAMINATIONS of all types, in all sizes and in all grades of materials.

FERROSIL hot-rolled and cold-reduced electrical sheet and strip, and hot-rolled transformer sheet.

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One of the laminations being notched on an indexing machine.

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Enquiries for laminations to be forwarded to RICHARD THOMAS & BALDWINS LIMITED, COOKLEY WORKS, BRIERLEY HILL, STAFFS.

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MINICLIP VOLT-AMMETER

8-Ranges

from this new versatile instrument

The Ferranti MINICLIP Volt-Ammeter extends the range of the well known Ferranti 7-Range Clip-on instruments and provides a pocket instrument of great versatility. Of modern design, the instrument gives easy, quick, single-handed operation. The thumb operated range selector switch selects the appropriate scale thus avoiding the use of multiplication factors. Eight ranges in all are provided comprising:
5 current ranges 0-4, 12, 40, 120 & 400 amps. A.C.
3 voltage ranges 0-150, 300 & 750 volts A.C.
For reliability and for the greater utilisation of space, printed circuit techniques have been used on the design of the MINICLIP, the new versatile instrument from Ferranti.

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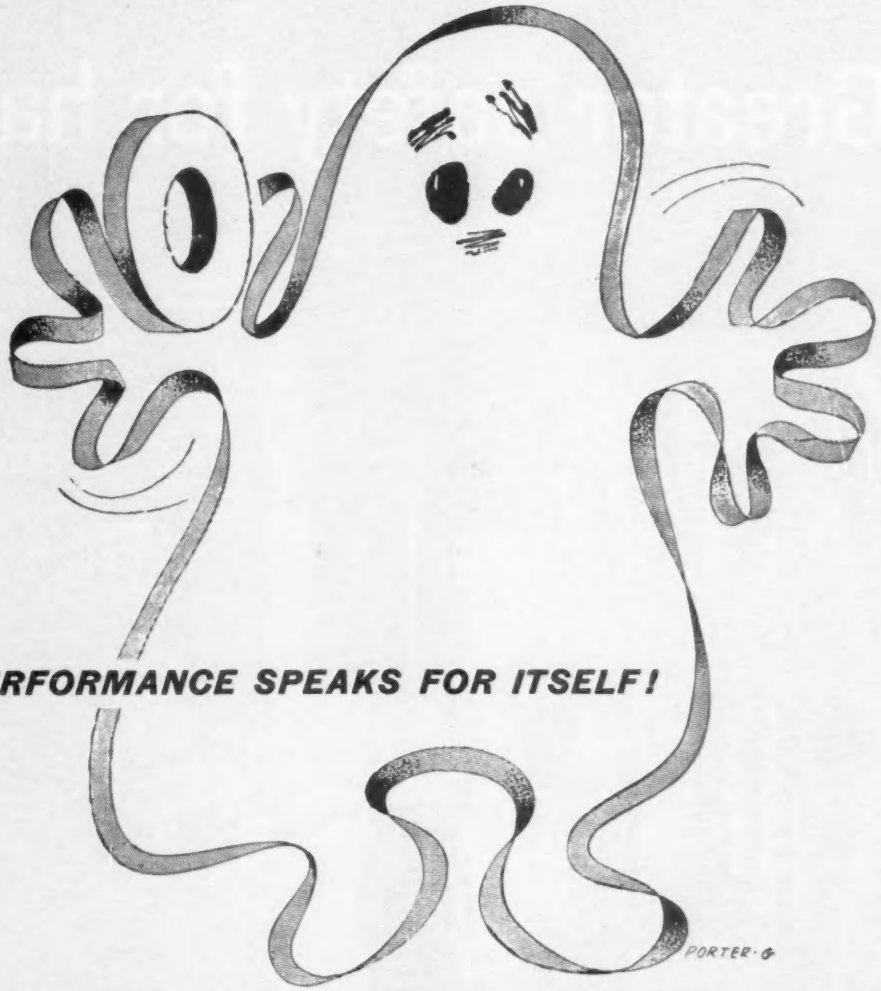
LASSO No. 92 PVC Electrical Tape can do everything but talk—



ITS PERFORMANCE SPEAKS FOR ITSELF!

Lasso No. 92 has so many properties, so many uses, we could fill this page with them. And dull reading it would make. A lot of stuff about pliability, water resistance, acid resistance, wrapping, jointing, insulating, binding, splicing — *that* sort of thing. Far better send for our alert young representative, *he* makes it sound interesting. Ask your secretary to drop us a line today.

SEND TODAY FOR OUR WALKIN', TALKIN', THINKIN' REP

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for all electrical and industrial uses

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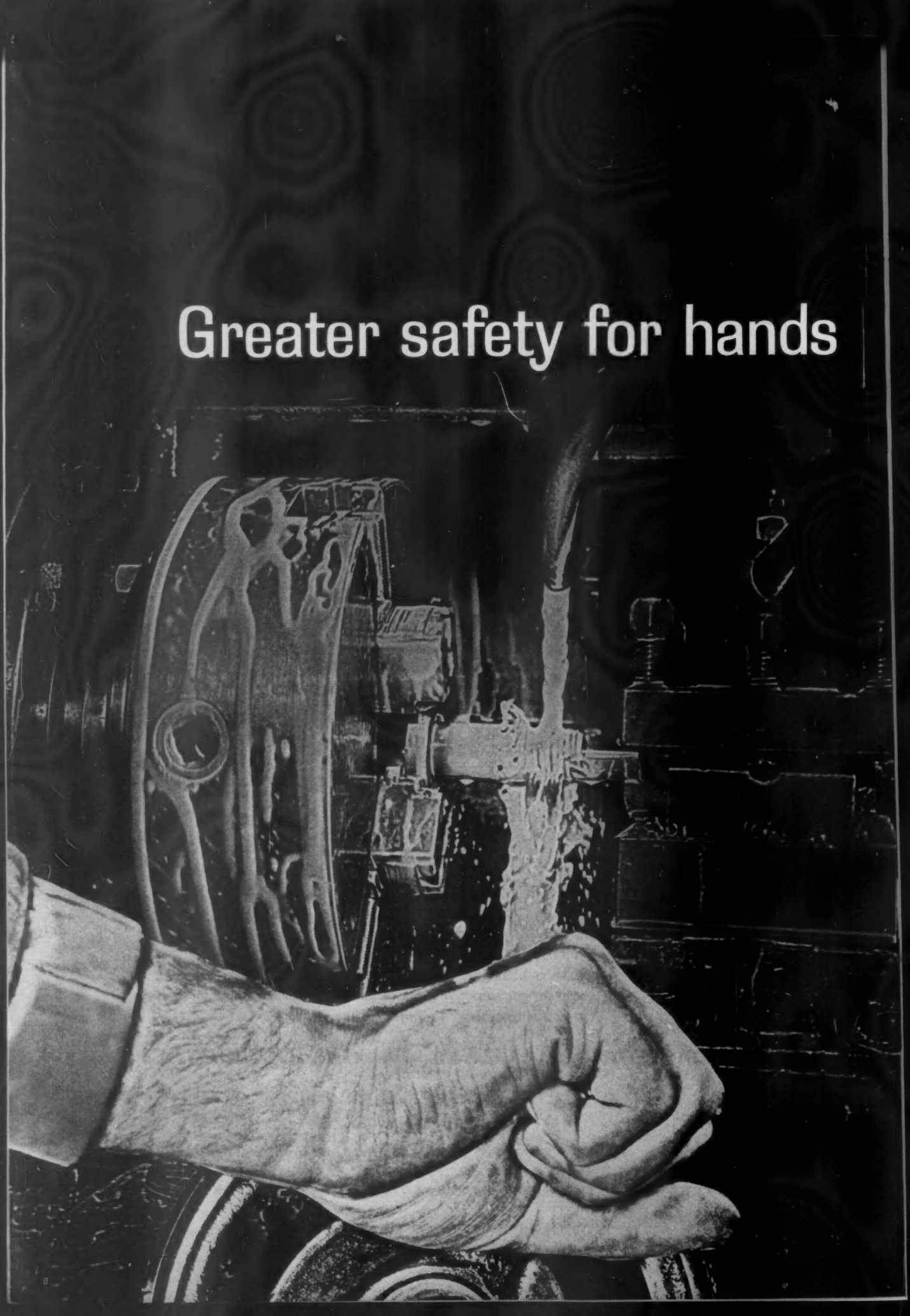
Greater safety for hands



With new Shell Dromus Oils

Most modern soluble cutting oils contain phenolic compounds used as coupling agents between the oil and the emulsifier, for better blending and easier mixing. These phenolic compounds can cause skin irritation, especially where modern high-speed machines are used and the emulsion can concentrate, through the evaporation of water, above the safety level.

Shell research chemists have been working on this problem, which has been causing some concern to Management. After considerable research, Shell Dromus Oils have been reformulated and these new cutting oils now produce bland emulsions, which considerably reduce the risk of skin trouble to operators.

The real difficulty was to find a new coupling agent to replace the phenolic compounds, and Shell finally used what their chemists know as a higher fatty alcohol complex. This solved one problem, but presented another. The new coupling agent was volatile at the high temperatures normally used in blending processes. Further research found a solution to this problem by designing and installing new plant.

The new Dromus Oils are every bit as efficient as before and cost no more. They put Management in the welcome position of being able to minimise working hazards at no extra cost. And machine men need no longer be so worried about skin troubles.

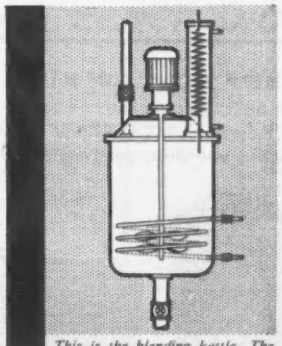
The moral of the story is that Shell research is supremely applicational. The centre at Thornton is always ready to work with even the most specialised sectors of industry to produce the right oil for the job. If you and your organization have any major lubricating problems, it pays to get in touch with your local supplier of Shell Industrial Lubricants.

The Research Story

Shell chemists in the U.K., in Holland and in the U.S.A., prepared and examined hundreds of experimental soluble oils, and established that certain combinations of fatty alcohols could be used in place of phenolic compounds with no loss of efficiency. They set to work to discover the best combination and developed a higher fatty alcohol complex which fitted exactly. Then they realised that to blend this new coupling agent into soluble oils would require special plant and new blending techniques.

Exhaustive testing of blend stability, emulsion stability, anti-corrosion and machining properties led to selection of the most promising blends. A pilot plant was set up to produce batches of these for use in field trials.

This field testing and final development proceeded for two years whilst production plants were erected at points so chosen as to give the most economical and rapid delivery throughout the United Kingdom.



This is the blending kettle. The reflux condenser beside the stirrer motor prevents the loss of constituents volatile at the blending temperature.

NEW SHELL DROMUS SOLUBLE CUTTING OILS

another proof of Shell leadership in lubrication

BOXES AND CLAMPS FOR M.I.C.C. CABLE

CABLE CLAMPS

Cable clamps are suitable for single or twin-core mineral insulated copper covered cable 0.0015 to 0.003 cross-sectional area.

List No. 901—single entry cable clamp.

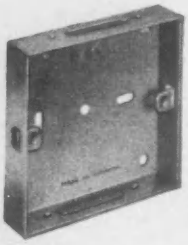
List No. 902—double entry cable clamp.

MK have introduced a new range of boxes and clamps for MICC cable. Single or double entry clamps are interchangeable with any of the boxes and are supplied separately with fixing screws and shakeproof washers. Steel boxes and cable clamps are zinc plated.

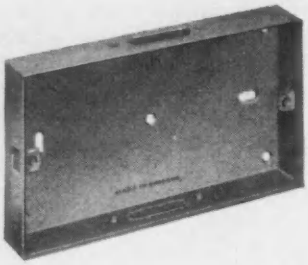
WRITE FOR LEAFLET 257

PLASTER-DEPTH BOXES FOR M.I.C.C. CABLE

These boxes have one clear entry and one knockout for attaching either single or double entry cable clamps.



List No. 3951 — Plaster-depth box with 2¾″ fixing centres.

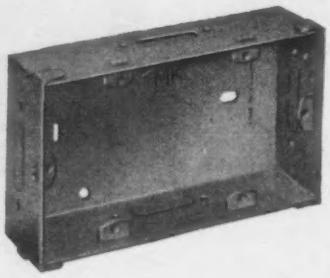


List No. 3952 — Plaster-depth box with 4¾″ fixing centres.

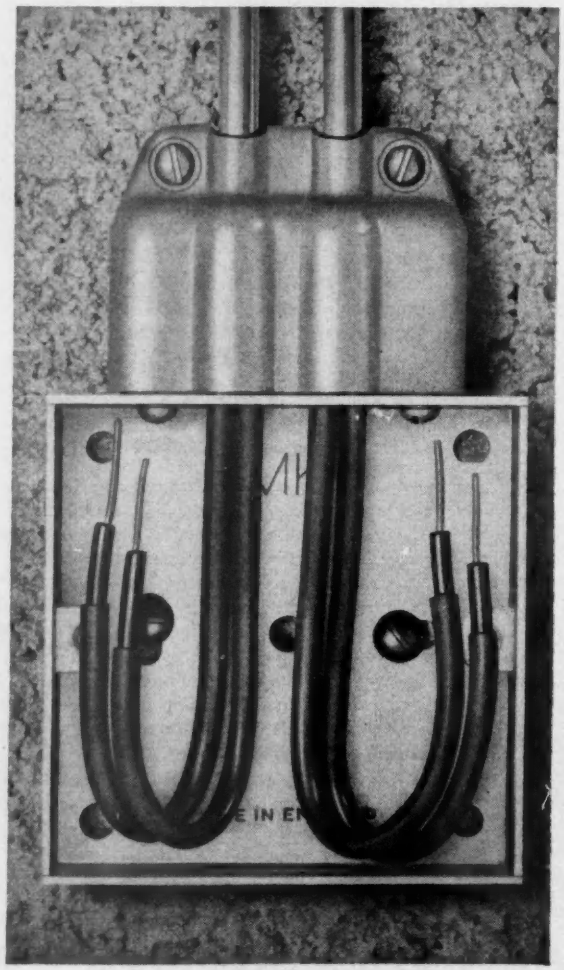
DEEP BOXES FOR M.I.C.C. CABLE

Deep boxes have one clear entry on one side and one knockout on each of the other three sides and one in the back to which can be attached a single or double entry cable clamp.

List No. 881—Box to BS 1299/1363 dimensions having 2¾″ fixing centres.

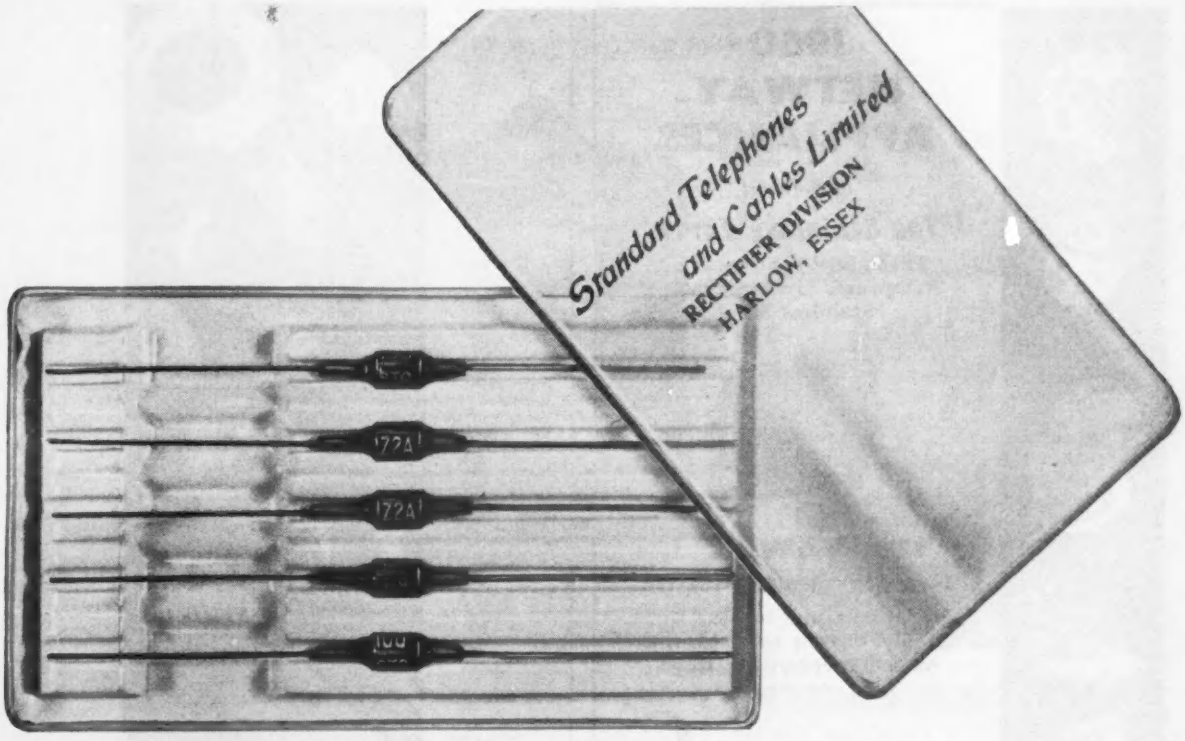


List No. 882—Box to accommodate any two gang MK accessory.

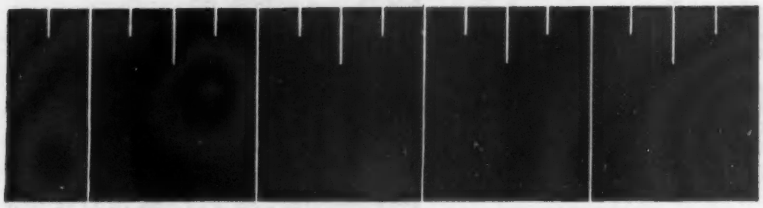


M.K. ELECTRIC LIMITED, SHRUBBERY ROAD, LONDON, N.9. EDMONTON 5151

MK197DHB



actual size



SenTerCel 1 WATT SILICON ZENER DIODES

- *Have a large dissipation for their size*
- *Are suitable for high temperature operation*
- *Have a low temperature co-efficient of voltage*
- *Are suitable for use as regulators, limiters, surge suppressors, and voltage references*
- *The first complete range of close-tolerance ZENER Diodes available from production*

Characteristics and ratings of SenTerCel Zener Diodes are given in publication MF/103

Z2 SERIES ZENER DIODES		
±5% Voltage Tolerance (Red and Green Sleeves)	TYPE	NOMINAL VOLTAGE
	Z2A33F	3.3
	Z2A36F	3.6
	Z2A39F	3.9
±10% Voltage Tolerance (Red and Yellow Sleeves)	Z2A43F	4.3
	Z2A47F	4.7
	Z2A51F	5.1
	Z2A56F	5.6
	Z2A62F	6.2
	Z2A68F	6.8
	Z2A75F	7.5
±20% Voltage Tolerance (Red and Blue Sleeves)	Z2A82F	8.2
	Z2A91F	9.1
	Z2A100F	10
	Z2A110F	11
	Z2A120F	12
	Z2A130F	13
	Z2A150F	15

STC COMPONENTS GROUP

60/4MF

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Three new appliances in Rustproof, Untarnishable, Stainless Steel

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AUTOMATIC TURNOVER TOASTER

Clockwork timer toasts 4 slices quickly, exactly to taste, with no trip mechanisms to go wrong

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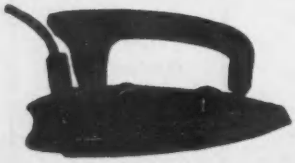
AN ARISTOCRAT AMONG IRONS

Rustproof, with 10 feet of flex. Weighs 3lbs., perfectly balanced on the newly designed handle. 600 watt embedded type element



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UNIVERSAL TRAVELLING IRON

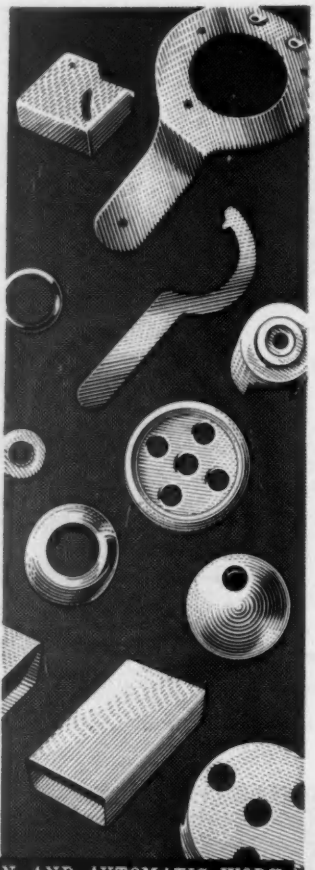
100/250 volts. Full size soleplate and folding handle. Complete with attractive tartan zip case

OUR 1960 CATALOGUE ALSO INCLUDES OUR NEW AUTOMATIC ELECTRIC HAND DRIER

WRITE TODAY FOR CAT. No. DAR/30/ET

METWAY

KEMP TOWN · BRIGHTON



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ANY METAL ANY FINISH

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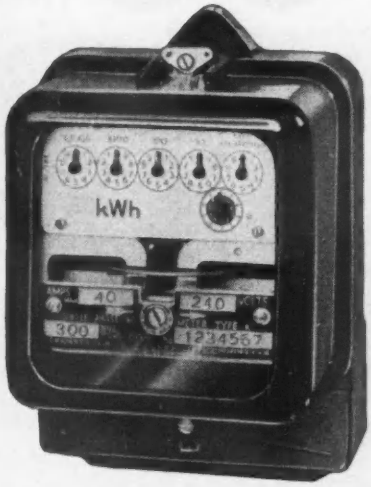
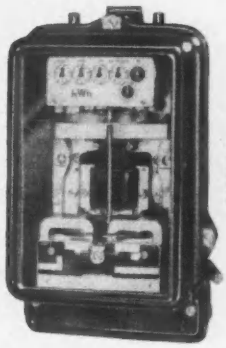


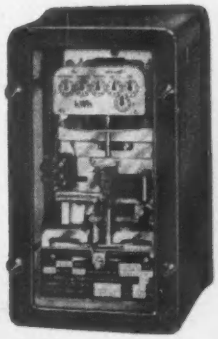
TYPE K
SINGLE PHASE



TYPE KT
3 PHASE
3 WIRE

C & H

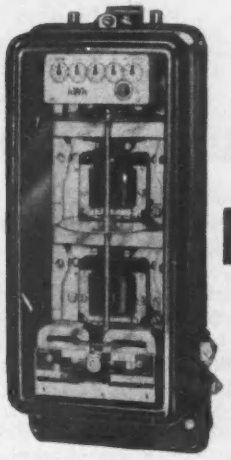
"K" Series of Meters



TYPE KTAC
3 PHASE
3 WIRE
PRECISION
PATTERN
WITH
"FLICK"
CONTACTOR

Please apply to us for appropriate Catalogue Sections covering this "K" series of meters

TYPE KP
SINGLE PHASE—
PREPAYMENT PATTERN



TYPE KT4
3 PHASE
4 WIRE

Chamberlain & Hookham Ltd.

SOLAR WORKS, BIRMINGHAM 5. TELEPHONE: MIDLAND 0661 & 0662

London Office: MAGNET HOUSE, KINGSWAY, W.C.2. TELEPHONE: TEMPLE BAR 9000

WHICH WAY WOULD YOU TAKE THE PYLONS?

Down in the valley, the town needs more power. The time's come to bring in a power line from the Grid. That means pylons, right across these fields, and on down into the valley.

There are perhaps a hundred paths the pylons could follow. *One* must be chosen. Not plotted arbitrarily across a map, but thoughtfully, carefully sited, so that pylons and cable strike the best possible balance with the landscape.

The Central Electricity Generating Board are just as concerned about this as they are about bringing in the power. For the nation has charged the Board with a double duty. Not only to maintain an efficient, economical electricity supply, but also to preserve the amenities of the country as they go.

That's why the new line will be planned so that it follows the dark background of a wood here; skirts a village there; crosses skylines in the most inconspicuous way to be found; and eventually reaches the town through its industrial suburbs.

These advertisements are appearing in the farming and country magazines. The Central Electricity Generating Board thank electrical contractors for their co-operation in the past, and know that they will do all they can to preserve the amenities of the countryside.

THE CENTRAL ELECTRICITY GENERATING BOARD CEGB

NEWS SHEET

Safety officers to be appointed by all building contractors employing plus-50 men required by draft MoL regulations. New requirements for protecting building workers against contact with overhead power lines. (695)

Total electricity capital spending to be £337m. in 1960-61, £358m. in 1961-62 says Treasury statement reviewing forward plans. CEGB accounts for £197m. and £201m. of totals respectively. (695)

No new contracts for Euston-Birmingham-Crewe electrification while Marples-headed committee reviews fundamental railway policy. Debate in Commons questions decision, which implies money saved may be used for non-railway transport developments. (666, 699)

Nuclear fuel charging machine at Bradwell installed above first reactor. Fuel charging will be under television supervision. Fuel loading scheduled to begin mid-March in first reactor; graphite laying in second reactor about to commence. (677)

CEE seeking standard colour code for fixed wiring as well as flexibles. Progress reported on clearances and creep distances for plugs and sockets, but UK doubtful on cable conductor dimensional standard. (678)

Multi-purpose control unit aids broiler rearing, is main feature of EDA exhibit at Dairy Show; controls heating, lighting, ventilation and food supplies. (698)

Pye and E. K. Cole merger proposed, with new holding company, the two firms retaining their identities: C. O. Stanley to be chairman, E. K. Cole, deputy chairman. (694)

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Forty-eight electrical firms will show at British Trade Fair in Moscow next year; largest ever to be held in USSR by foreign country. Reciprocal USSR trade fair for London one month later. (697)

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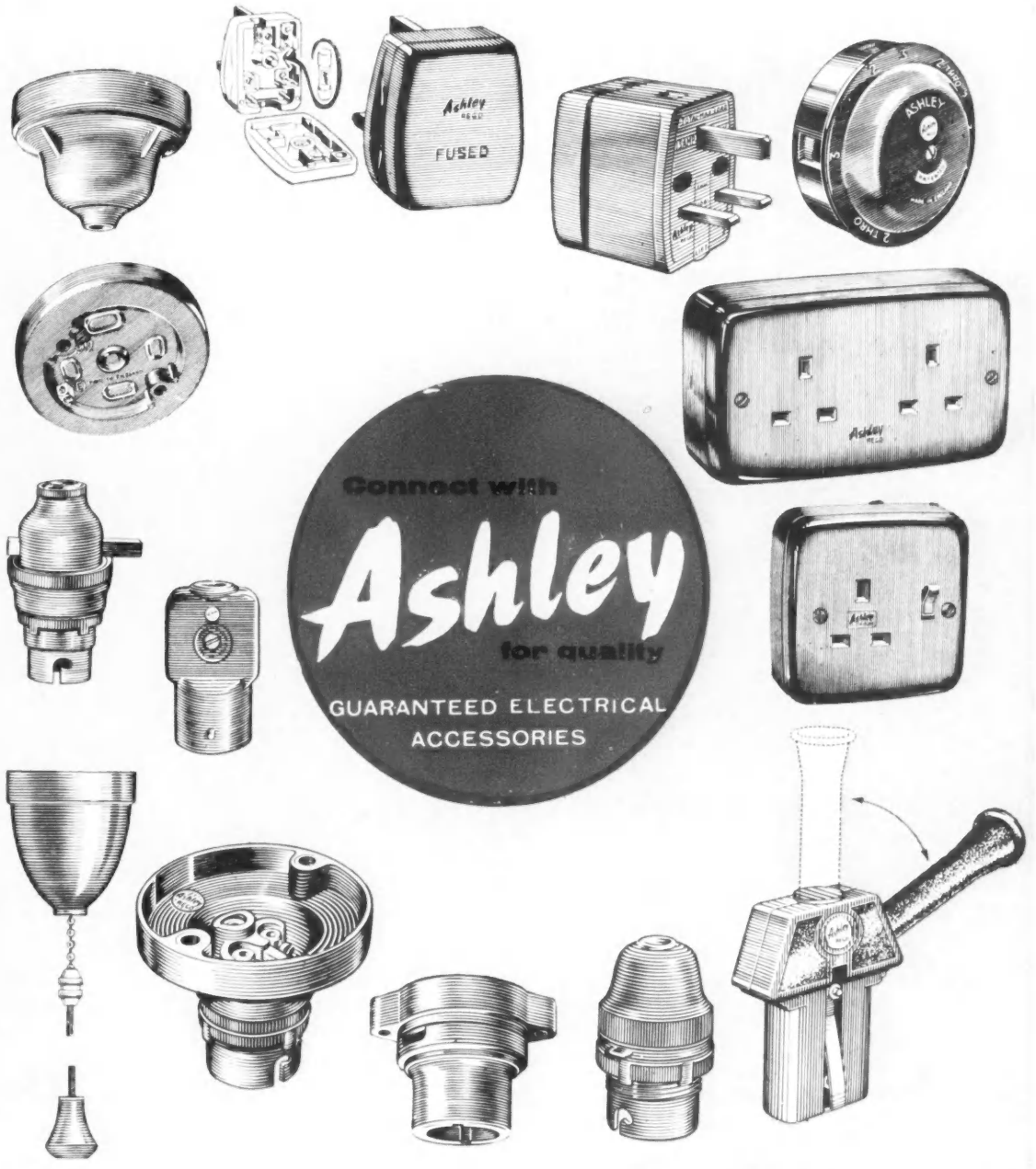

FOR LONG TROUBLE-FREE SERVICE —USE "ASHLEY"

Illustrated Catalogue available on request

Illustrated above are a representative selection of "Ashley" quality controlled wiring accessories.

Some recently introduced salient features for the discriminating user:

★ Twin 13 amp Socket with 'Pattrebox' (Reg. Trade Mark) for completely fulfilling all initial and conversion surface mounting conditions.

★ All 13 amp Switchsockets now have a 'Safety Switch' (second switch in series with dolly switch) automatically preventing plug pins becoming live until almost home.

★ 5 and 6 terminal 20 amp Junction Boxes with selective wiring entry facilities.

ASHLEY ACCESSORIES LTD., Ulverston, Lancashire, Eng. Tel: Ulverston 3333 Grams: "Ashley" Ulverston

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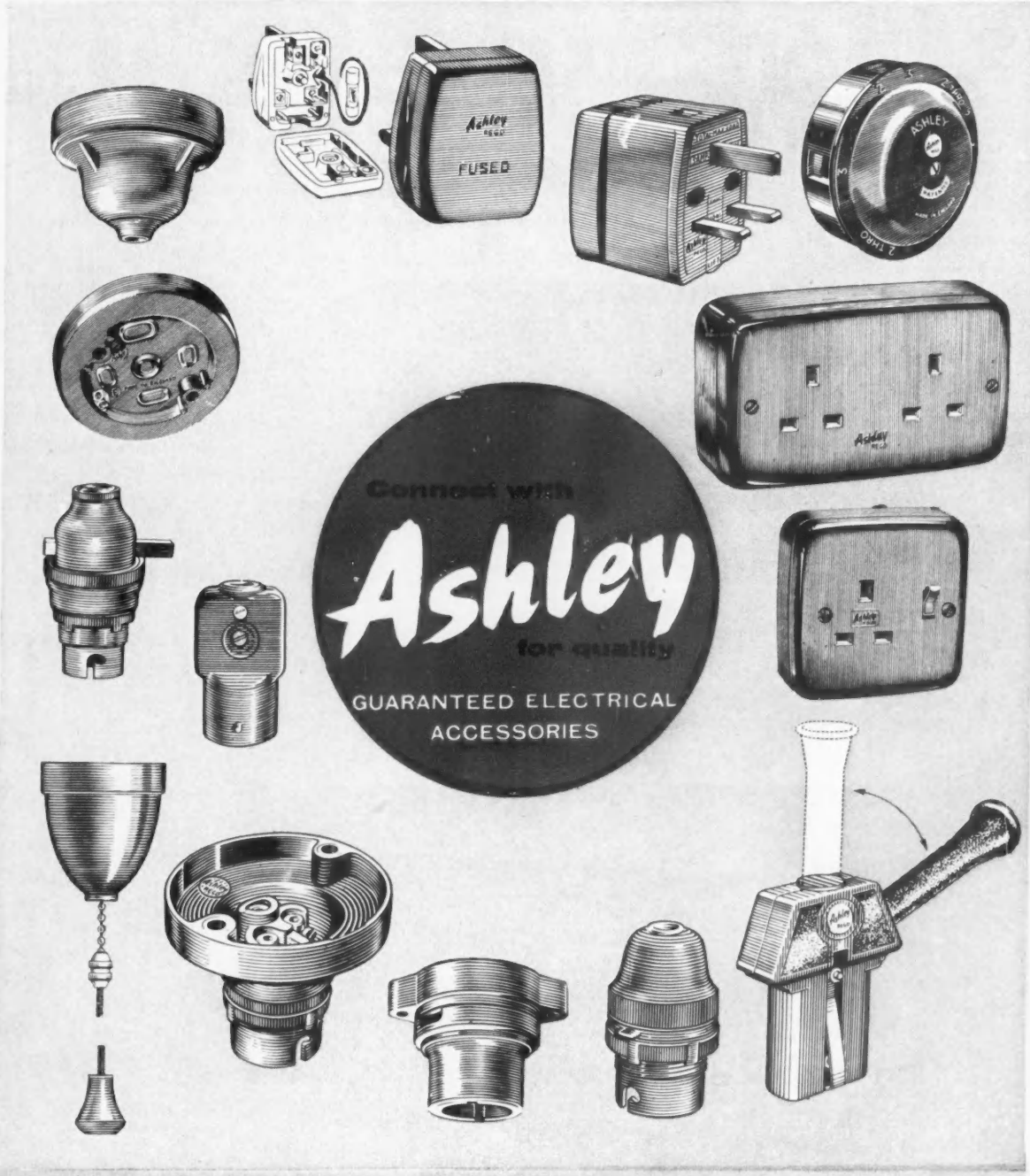

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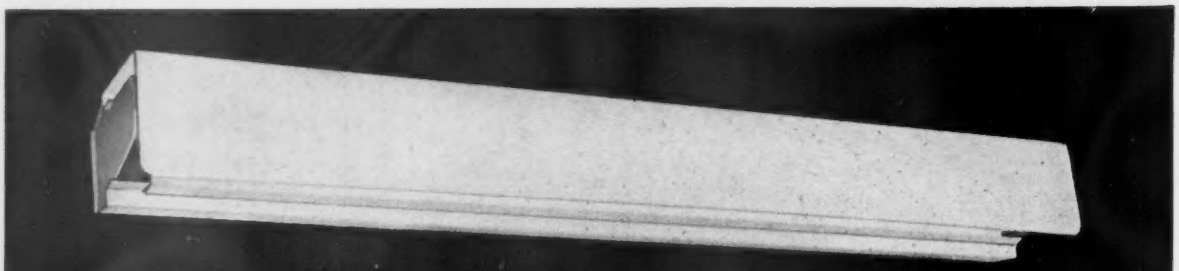
C

atlas super-slim popular packs



new KN decorative diffuser

A new addition to the super slim Popular Packs range with which to satisfy the ever increasing demand for fluorescent fittings with an extra decorative touch. The opal plastic diffuser is ideal for use over mirrors, dressing tables, etc. and can be reversed for indirect lighting.

Fitting	Atlas super-slim Popular Pack complete with tube (inc. P. Tax)	KN Diffuser (inc. P. Tax)
4 ft. 40w. Cat. No. HDK/0040	£3-14-5	**£1-11-11**
2 ft. 20w. Cat. No. HDK/0020	£2-15-10	**£1-2-6**

KW diffuser down in price

New low prices make the KW diffuser an even more attractive proposition for your customers . . and it's a best seller already for decorative commercial uses. In extruded plastic with blue end panels and simple clip-on action for easy cleaning.

Fitting	Atlas super-slim Popular Pack complete with tube (inc. P. Tax.)	KW DIFFUSER	
		OLD PRICE (inc. P. Tax)	**NEW PRICE** (inc. P. Tax)
8 ft. 125w. Cat. No. HDK/0125	£7-6-0	£4-14-8	**£3-11-0**
5 ft. 80w. Cat. No. HDK/0080	£4-11-4	£2-19-2	**£2-7-4**
4 ft. 40w. Cat. No. HDK/0040	£3-14-5	£2-10-11	**£2-2-7**
2 ft. 20w. Cat. No. HDK/0020	£2-15-0	£1-15-6	**£1-9-7**

atlas ATLAS LIGHTING LIMITED · THORN HOUSE · UPPER ST. MARTIN'S LANE · LONDON · WC2

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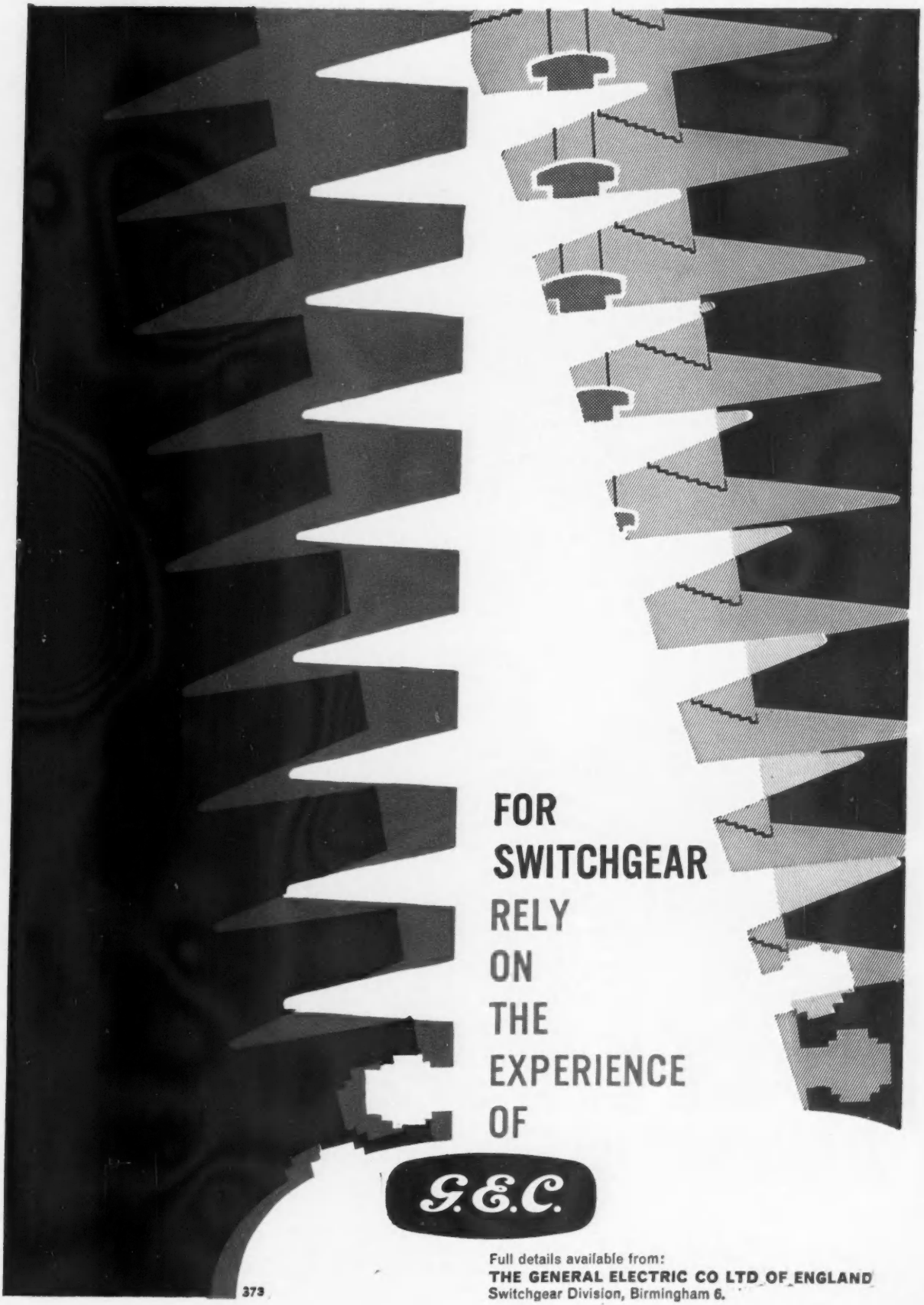
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Full details available from:
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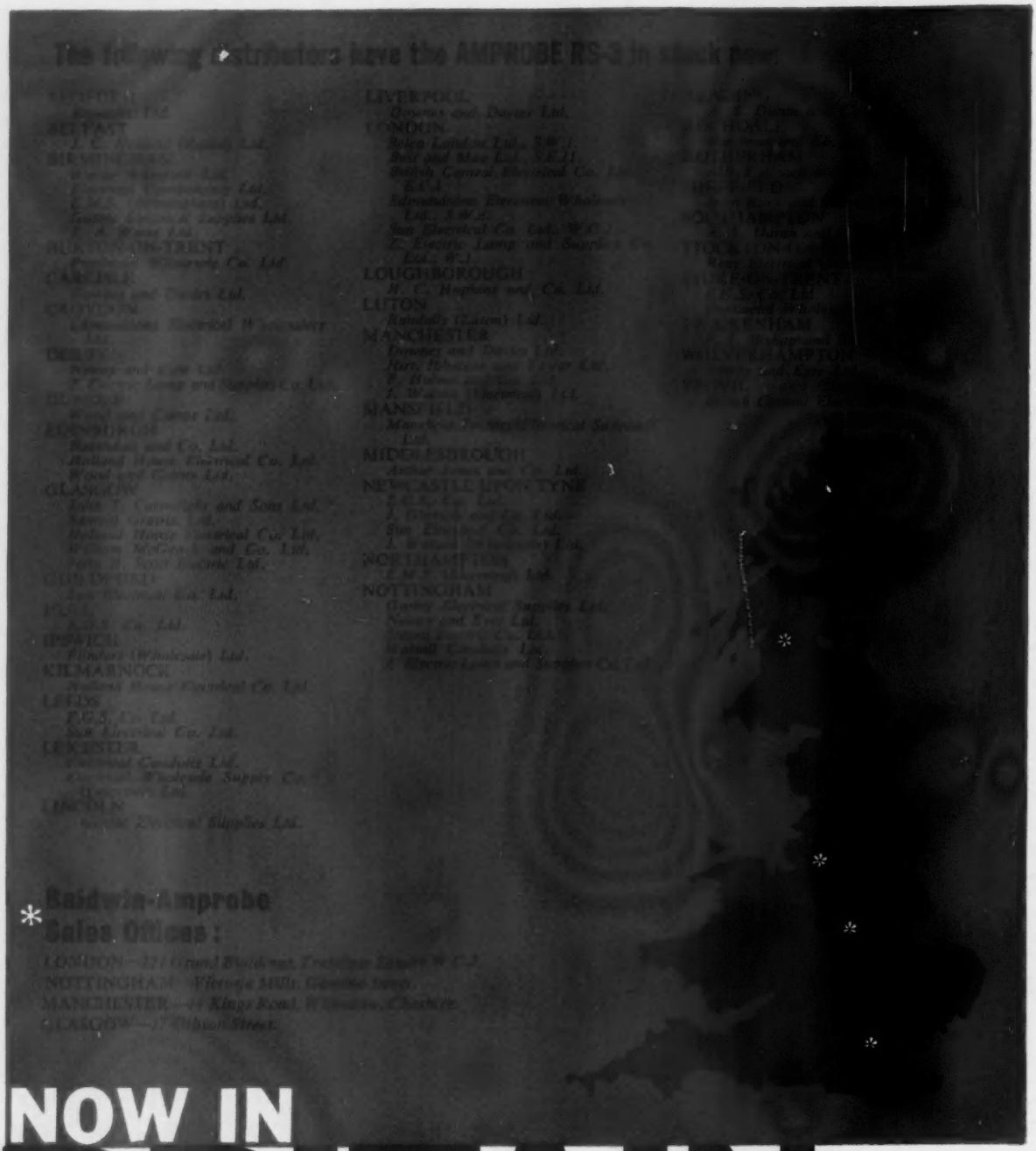
Switchgear Division, Birmingham 6.



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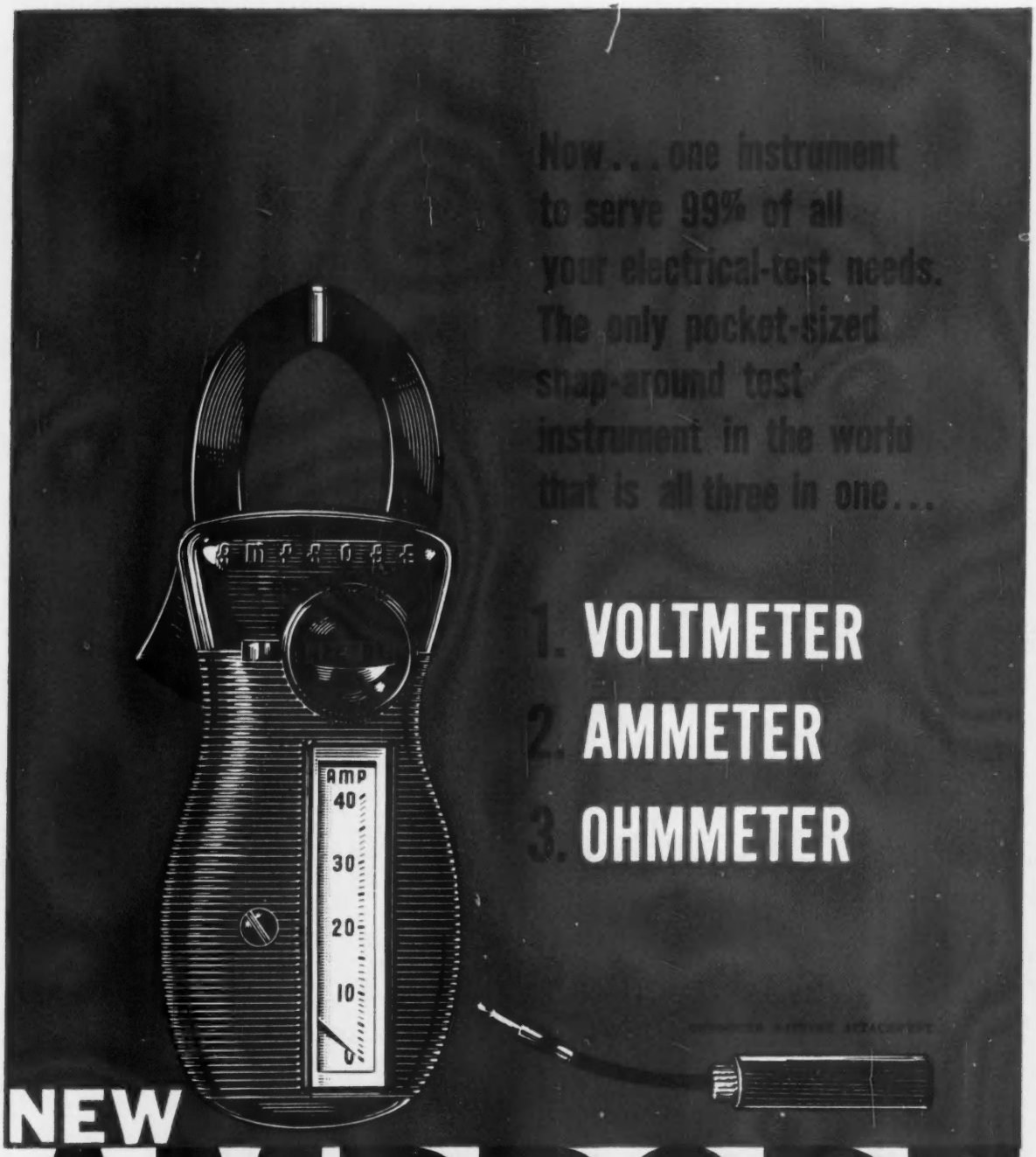
World-famous AMPROBE snap-around, electrical-test instruments are now being sold, for the first time, in England—exclusively through distributors. Now you can get *off-the-shelf* delivery of the versatile AMPROBE RS-3 or any of the other precision test instruments in the extensive AMPROBE line from any of the distributors listed above. See one today.

ONE-YEAR GUARANTEE. The AMPROBE RS-3 is guaranteed for one whole year, and that guarantee is supported by service facilities (to assure your complete satisfaction) at the following address: INSTRUMENTS ELECTRICAL CO., LTD., 107 NEWINGTON CSWY., LONDON, S.E. 1,



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RS-3 The new AMPROBE RS-3 is the only snap-around, electrical-test instrument in the world that precisely measures current, voltage and resistance. It traces circuits, tests for opens, checks relays, armatures, field resistances...in fact, it accurately meets 99.9% of *all* your electrical-test needs. The RS-3 has five current ranges: 0/5/15/40/100/300 amps; three voltage ranges: 0/150/300/600; and an ohmmeter range with 25 ohms midscale. It comes complete with ohmmeter attachment, voltage test leads and genuine cowhide leather case—all for a price you'd expect to pay for testers which only perform two functions. For more details, see your distributor today or write to:

PYRAMID INSTRUMENT CORPORATION
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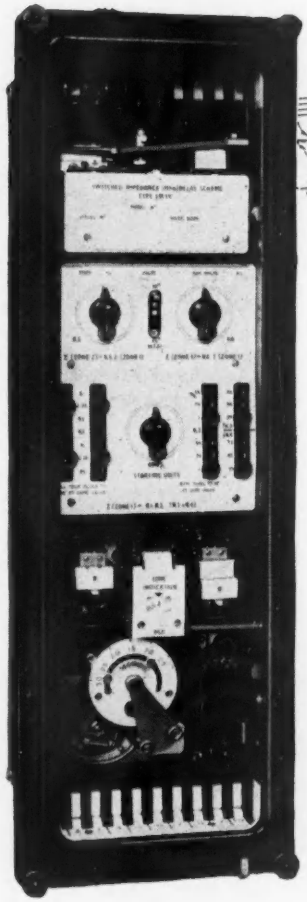
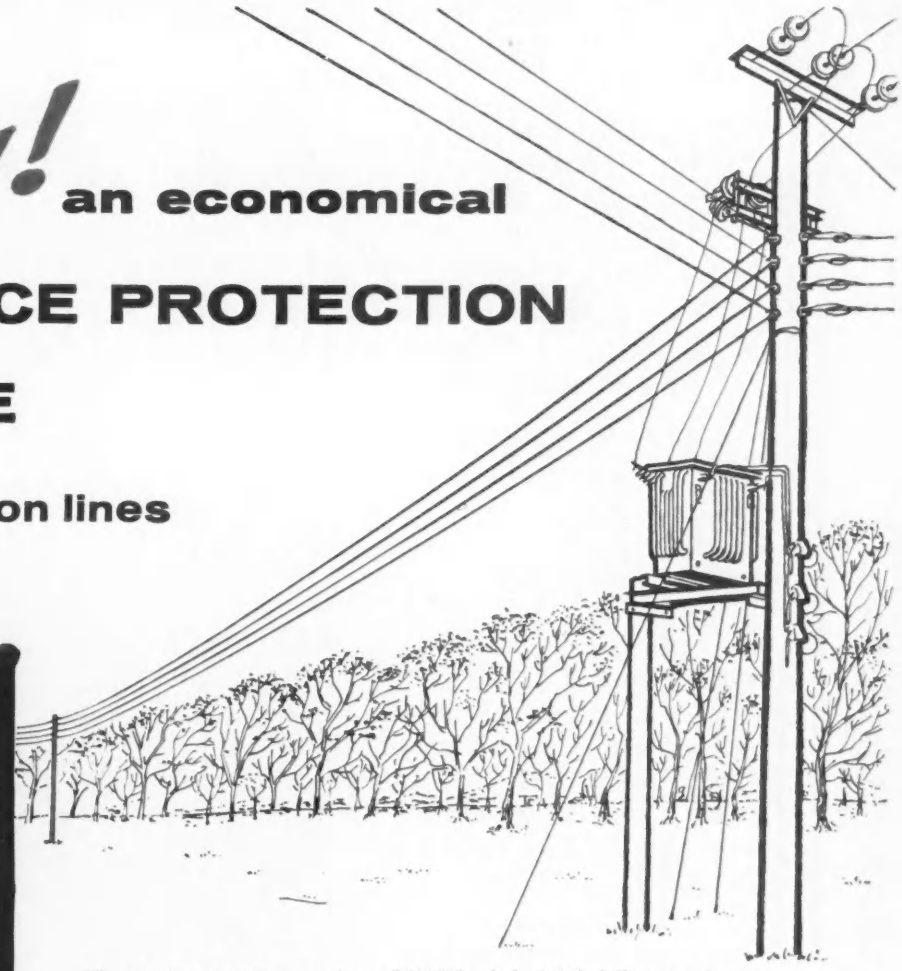
Strictly between ourselves Carruthers, these animated totems have got a touch of the old mass hysteria. It won't last, laddie—mass production stuff never does. Ask 'Snorty' Masters! He's in copper wire with those Symonds wallahs. Every inch of their wire, strip, and strand, is precision made. Bags of the old craftsmanship, what! Their stuff will still be on when sahib and chips is off.

Serious enquiries please to R. H. SYMONDS LTD *47 Victoria St., S.W.1. Tel: Abbey 2771/5*

Now! an economical DISTANCE PROTECTION SCHEME

for distribution lines





The new 'ENGLISH ELECTRIC' type SSM3V switched 'Mho' distance scheme provides phase fault protection for 11 kV or 33 kV lines at a cost very little more than inverse-time overcurrent relays. It overcomes discrimination problems and is high speed in operation.

Correct zone and phase flagging is always ensured by a simple interlock system which releases the flag mechanism only when the relay trips.

The complete three-step scheme uses standard, well-proved 'ENGLISH ELECTRIC' relay units and is accommodated in a normal triple-pole relay case.

Send for Publication MS 3125 to:
The ENGLISH ELECTRIC Company Limited, Relay Department, Stafford.

'ENGLISH ELECTRIC'

relays

THE ENGLISH ELECTRIC COMPANY LIMITED, ENGLISH ELECTRIC HOUSE, STRAND, LONDON, W.C.2
WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

RL43

J. & P. Silicone Rubber Insulated Cables...

...for nuclear-powered submarine 'Dreadnought'

It is significant that the Admiralty commissioned J. & P. to design and manufacture the special silicone rubber insulated cables to be used throughout the first British nuclear-powered submarine. The cables are designed to withstand a water pressure of 200 p.s.i. in the event of a compartment of the submarine being flooded.

The 3,500 ton "Dreadnought" will have a primary role as a submarine hunter-killer and be equipped with the latest underwater weapons and detection equipment. She will be fitted with inertial navigation and with a means of measuring her depth under ice to allow passage beneath the Earth's polar ice caps.

KEY TO DRAWING:

1. Hydroplane
2. Torpedo Tubes
3. Torpedo Compartment
4. Officers' accommodation
5. Crew accommodation
6. Stores compartments
7. Pump compartment
8. Control compartment
9. Captain's accommodation
10. Wash places
11. Galley
12. Battery compartment
13. Reactor
14. Machinery control compartment
15. Main machinery compartments
16. Turbine gearing
17. Motor

JOHNSON & PHILLIPS LTD. ELECTRICAL ENGINEERS & CABLE MAKERS
CHARLTON · LONDON · S.E. 7

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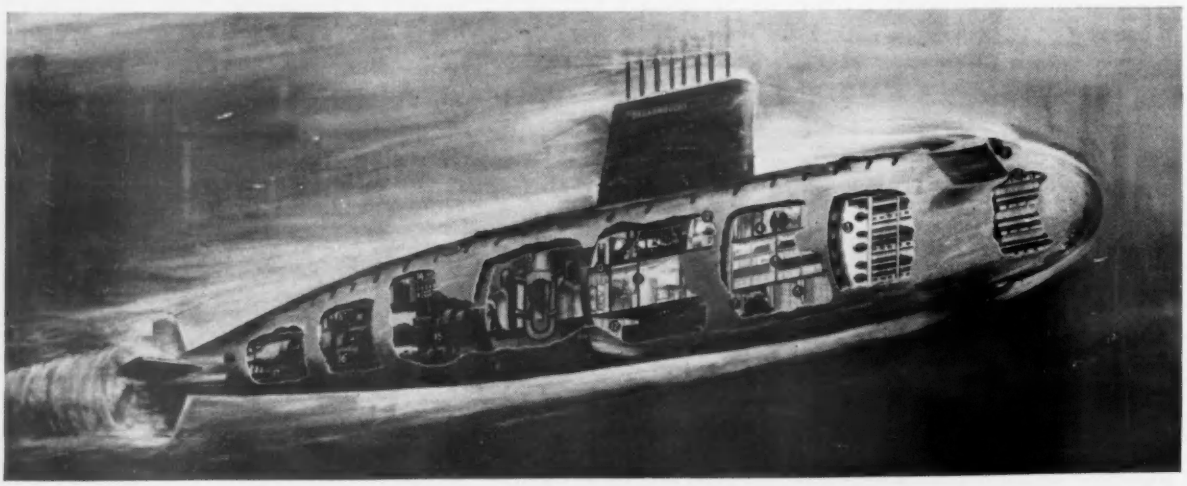

A·E·I–HOTPOINT

use *AMP solderless wiring devices

*Application of *Faston terminals to refrigerator harness*

*Faston Terminal

The Hotpoint E.37 Iced Diamond (3.7 cu. ft.) Refrigerator.

(Photograph by courtesy of A.E.I.—Hotpoint Ltd.)

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▲ QUICKER APPLICATION
▲ RELIABLE PERFORMANCE
▲ M·O·S AND A·R·B APPROVED
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AMP
TRADE MARK
* Trade Mark of AMP Incorporated, U.S.A.

Pre-selling hard for you this Christmas

HEAVY HOOVER ADVERTISING

Big space Hoover Gift advertising will bring more and more people to your shop between now and Christmas

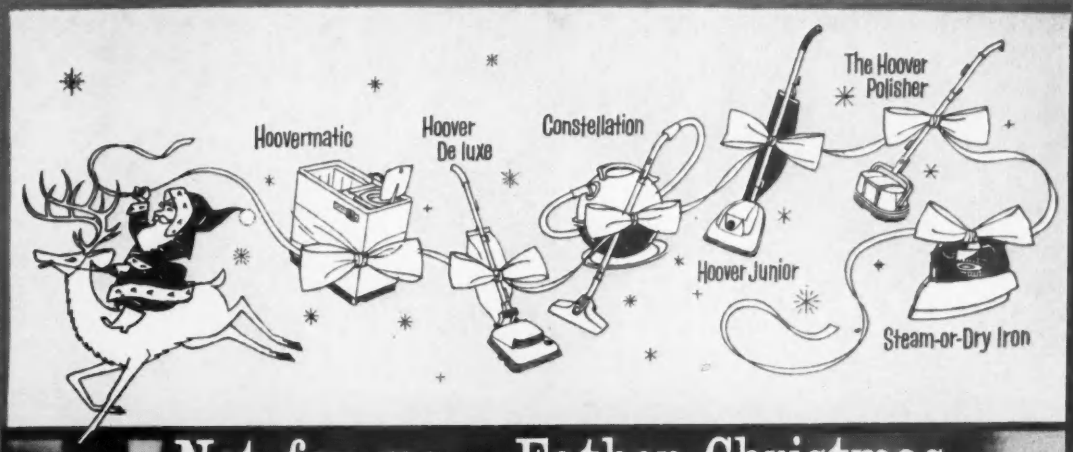
★ SPECIAL TV CAMPAIGN – on all stations
★ NATIONAL PRESS – dominating all-products ads.
★ PROVINCIAL PRESS – extra heavy Nation-wide bookings
★ FULL-COLOUR PAGES IN THE WOMEN'S MAGAZINES
★ FORCEFUL DISPLAY MATERIAL

This all-out advertising effort will stimulate a tremendous demand for Hoover products! Here's a timely reminder. Be ready—stock up NOW! Identify your shop with this tremendous campaign by installing a Hoover Christmas Display. And remember, the highly trained Hoover sales force will be pre-selling for you.

Here is the big space advertisement that will be appearing in the National and Provincial Press. And this theme will repeat through all Hoover Christmas advertising from TV to point-of-sale material, so tie in with pre-existing display – and sell!

Profit with HOOVER this Christmas

Stock up NOW



Not for me...Father Christmas ...but for my Mummy

This Christmas give every Mummy a **HOOVER**

FOR THE MANUFACTURER WHO DOESN'T KNOW...

- Large differential to avoid rapid cycling — approximately 18°F (10°C.)
- Nominal temperature range 100°F (55°C.)
- Standard unit set to switch off at top point of scale — approximately 150°F (65°C.)

. . . that the Sunvic TA. 1 Thermostat is the most reliable and adaptable unit of its kind. Already used by most convector manufacturers today, the TA. 1 Thermostat is also ideal for fan heaters, heating cabinets, and similar equipment. It operates on the self-heat principle, and has a wide bimetal fully exposed to the air stream. The snap-action micro-switch—rated at 15 a. 250V A.C.—has large silver contacts to ensure low contact resistance and long life. *Write for Publication 3012.*

AEI

Instrumentation Division
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SC/101

At Kariba the cut-off and blanket treatment below the main dam and the high pressure rock consolidation for the underground power station, extending some 400 feet below impounded water level, are vital elements of the project. These were among the many specialist works entrusted to The Cementation Company on this project.

In the civil engineering, building and mining fields the Cementation Group of Companies specialises in cementation, reinforced concrete construction, shaft sinking, geophysical surveys, exploratory mineral drilling, soil mechanics, piling, guniting, vibroflotation and soil stabilisation. Its resources can be made rapidly available to clients in any part of the world.

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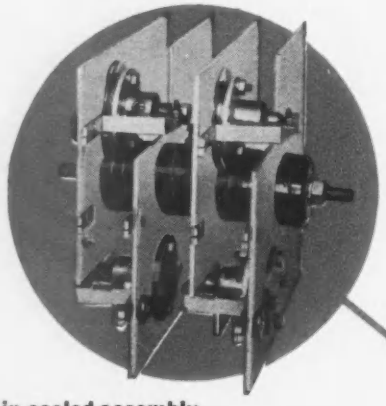
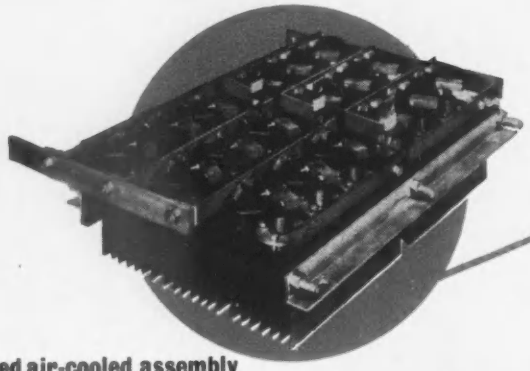
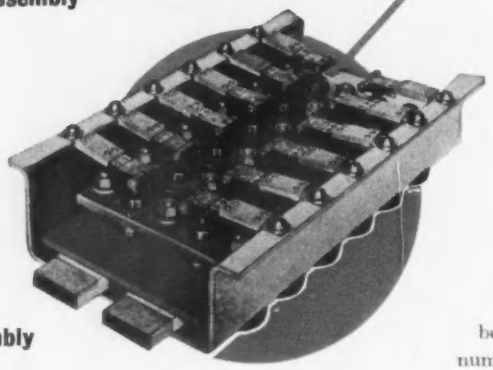


Natural air-cooled assembly

- Basic diode ratings of 33 amperes up to 100 volts.
- Ratings allow for continuous overloads of up to 1·3 times full-load current.
- High efficiency.
- Low voltage drop.
- Available as diodes, natural air-cooled units, forced air-cooled units and water-cooled assemblies.



Forced air-cooled assembly



Water-cooled assembly

WESTINGHOUSE germanium rectifiers are supplying many megawatts of power in a wide variety of applications: battery charging - works power supplies - electrolytic processes - and single items such as organ supplies - to quote only a few. If you have a problem involving a.c. to d.c. conversion, why not consult WESTINGHOUSE for advice. We shall only be too pleased to count you amongst our numerous satisfied customers.

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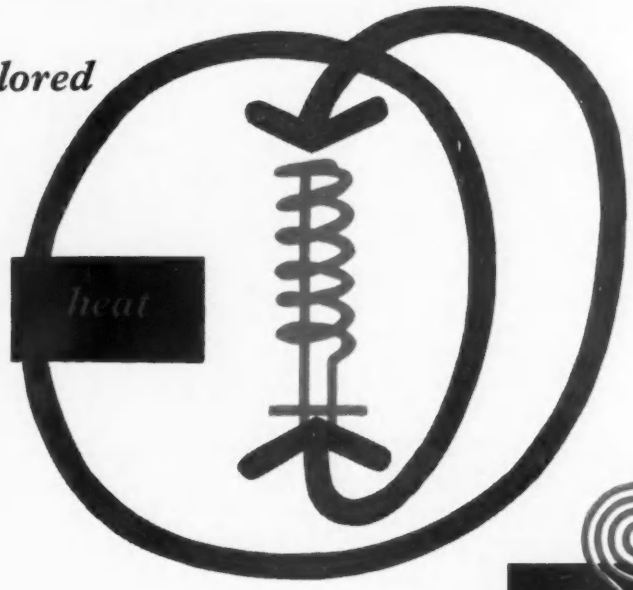

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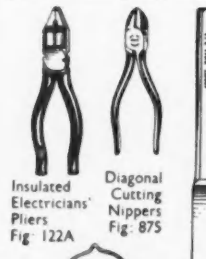
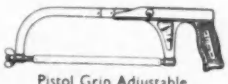

Insulated Electricians' Pliers Fig: 122A

Diagonal Cutting Nippers Fig: 875

All-steel Wood Chisels

Steel Tool Box Fig: 18


Pistol Grip Adjustable Hacksaw Frame Fig: 137

Leather lined Tool Bags Fig: 245

Linesman's Safety Belt Fig: 2013

Cabinet Turnscrews Fig: 542

Files Various

"Footprint" Wrenches Fig: 698

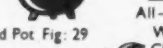
Linesmen's Pliers Fig: 122B

Tinsnips Fig: 650

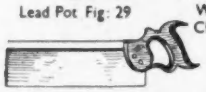
Carpenters Screw Augers Fig: 552

Tin Bottle Fig: 439

Blow Lamp Petrol or Paraffin Fig: 149


Lead Pot Fig: 29

Weldless Forged Melting Ladles Fig: 30


Tenon Saw Fig: 522

Linesman's Pole Climbers Fig: 2017

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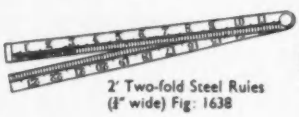
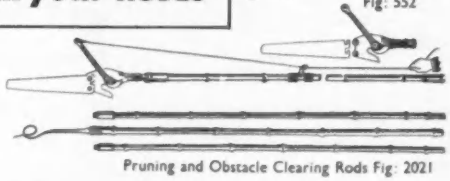

2' Two-fold Steel Rules (½" wide) Fig: 1638

Shave Hook Fig: 487


Pruning and Obstacle Clearing Rods Fig: 2021

Draw Vice & Key Fig: 2014

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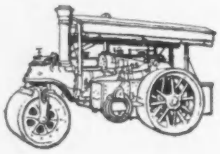

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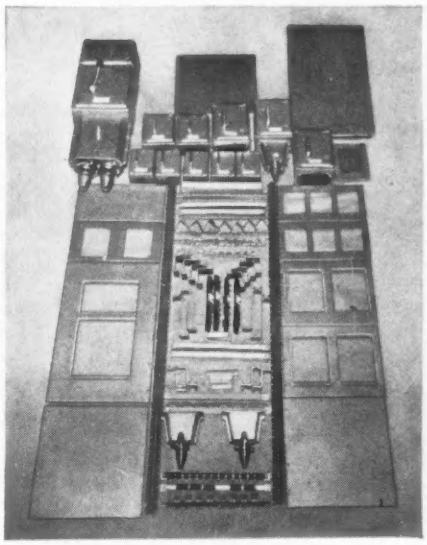

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Photographs by courtesy of The Midlands Electricity Board and The Governors of Sebright's Endowed Schools, Wolverly, Worcs.

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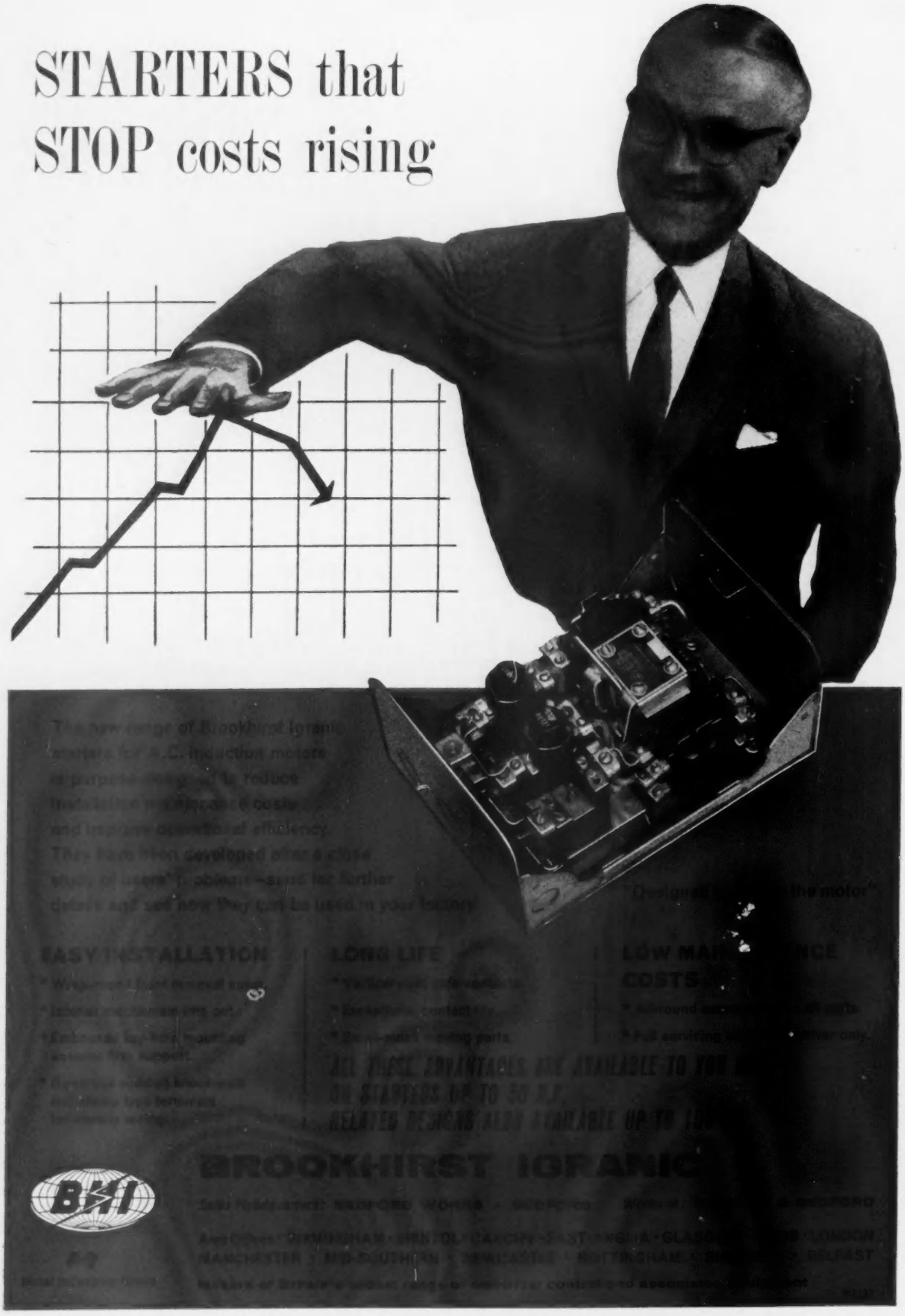

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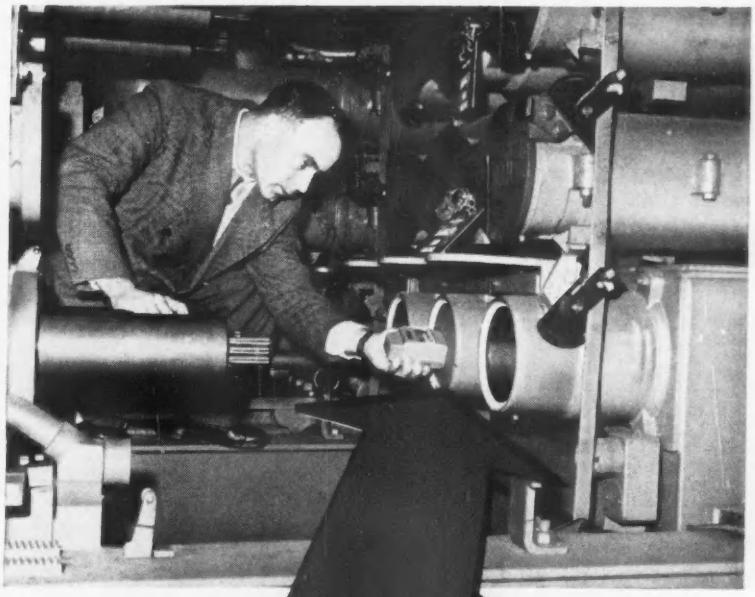
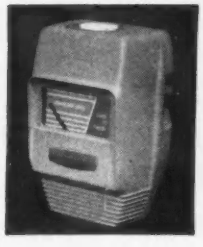


Checking a feeder spout on 33 kV horizontal draw-out metalclad switchgear prior to earthing. *(Photo by courtesy of Central Electricity Generating Board.)*

An entirely new approach to an old problem, that of live line detection to satisfy "safe to work" rules. No contact is made with the conductor as the "METRAC" detects the electrostatic field set up by a conductor energised by an A.C. voltage. The pointer gives a clear unambiguous indication of danger or safety against an illuminated red and green indicator plate suitably inscribed. Push button operated, small in dimension and weighing less than 2 lbs., it is a one-hand instrument.

★ Available for use at the spouts of draw-out or drop-down metalclad switchgear up to 66 kV. The protective shield prevents insertion beyond the mouth of the spout.

On the right is a model for overhead lines, busbars, conductors and switchgear up to 275 kV. In this, the detecting probe is internal and the shield is omitted. This new instrument is fully described in Catalogue Sheet 255B. Please write for your copy.



★ Manufactured under licence from the Central Electricity Generating Board and accepted by the National Committee for the Approval of Voltage Testing Devices. Is the subject of patent applications both in Great Britain and abroad.

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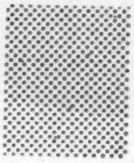

Class C & Class H *silicone-insulated, dry-type transformers are fire and explosion proof. They are not affected by dust and humidity. And because they will withstand repeated overloading, rating does not have to be based on peak loads. For safety, reliability and low maintenance costs, silicone-insulated transformers hold every advantage.*

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Midland Silicones Ltd supply the silicone resins and elastomers used in the manufacture of Class C and Class H transformers. Here is a list of well-known British manufacturers producing silicone-insulated dry-type transformers for the United Kingdom and overseas.

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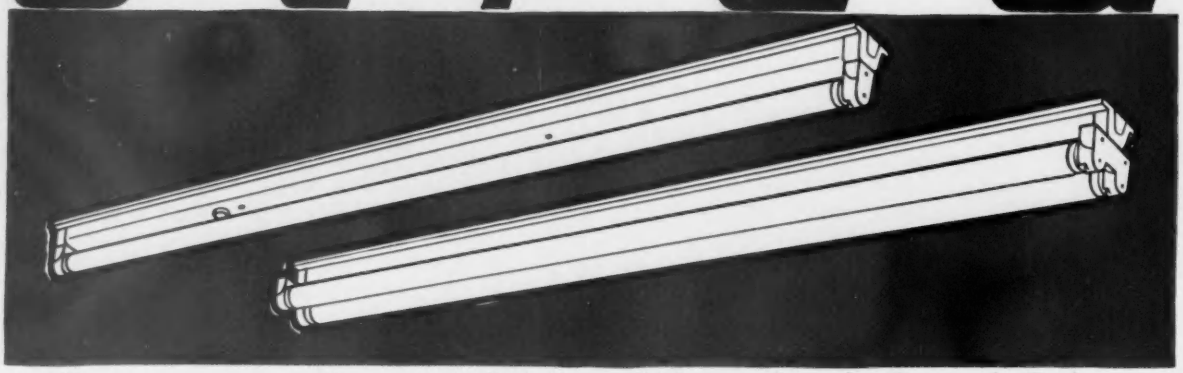

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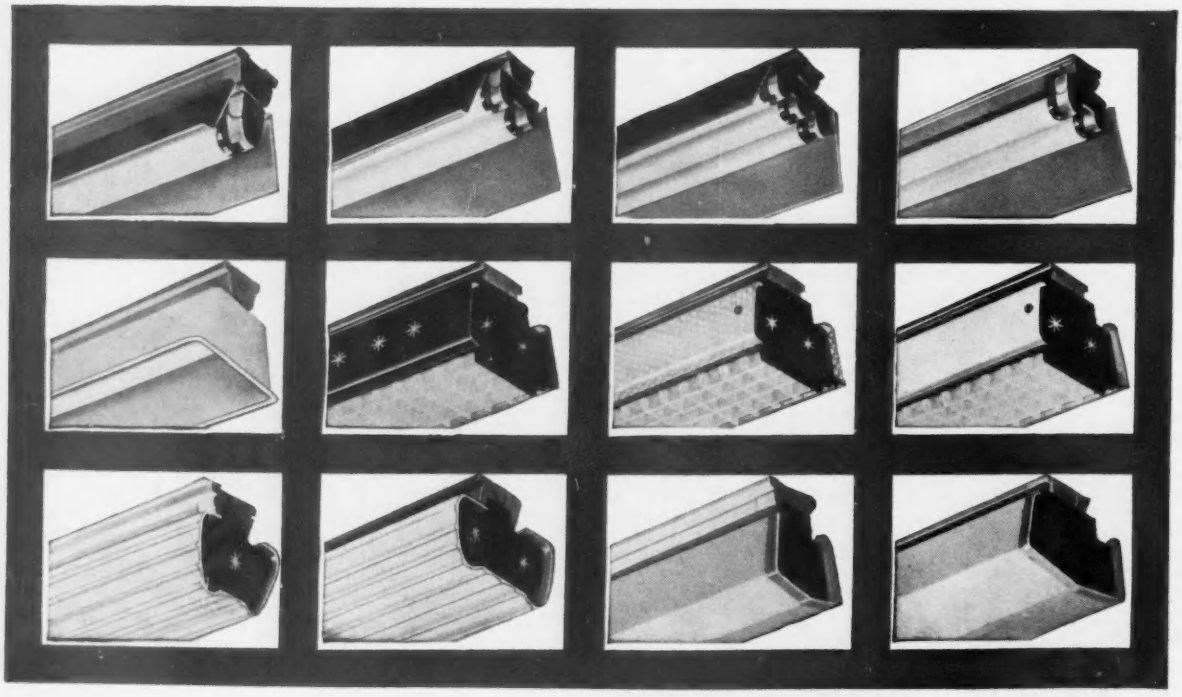

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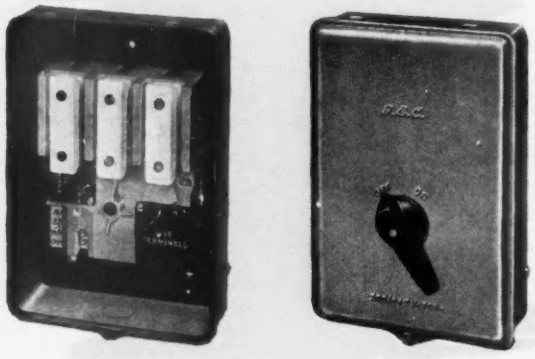

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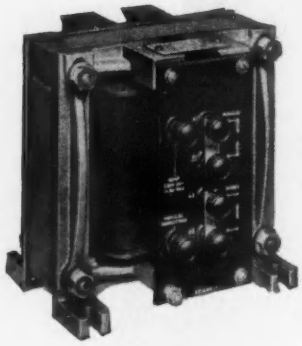

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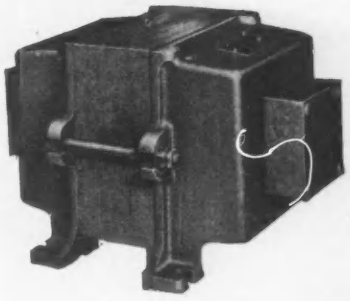

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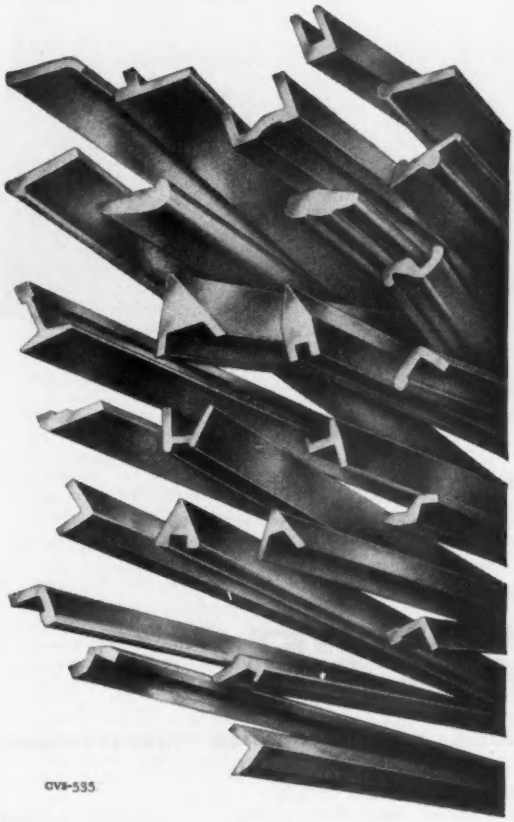

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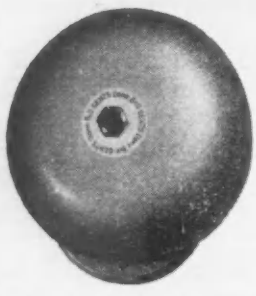

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Dans ce numéro

Analyseur de réseau de la 'CEGB' ... 667
Deux grands analyseurs analogues de réseau sont installés au Service Central de la "Central Electricity Generating Board," à Londres L'un est un analyseur de courant continu, employé pour études rapides d'ordre préliminaire; l'autre, est un dispositif de courant alternatif donnant un degré de précision très élevé pour l'étude des systèmes d'opération et de stabilité. L'analyseur à courant continu est opéré à l'aide d'une alimentation de 1,000 cycles et comprend 32 unités génératrices, 64 unités d'impédance de charge, 162 unités d'impédance de ligne, 30 unités autotransformatrices et 24 unités de transformateurs de couplage.

Le Centrale Nucléaire de Bradwell ... 677
La charge et la décharge d'éléments combustibles à la Centrale Nucléaire de Bradwell seront assurées par une seule machine d'une capacité de 400 tonnes, opérée par commande à distance. La livraison des combustibles à la Centrale est maintenant en cours, et ceux-ci seront chargés dans les réacteurs nucléaires à partir du mois de mars, 1961.

L'Industrie et le courant continu ... 679
Il existe une demande considérable de la part de l'Industrie pour le courant continu, et cette demande doit être satisfaite par l'emploi d'un appareil de redresseur, groupes Ward-Leonard et dispositifs semblables. Dans certaines industries, notamment les procédés électrochimiques, les demandes pour courant continu sont nombreuses et représentent la majeure partie des besoins de force motrice pour l'industrie; toutefois, dans le cas d'autres industries, tels que les laminoirs, trains à bandes, etc., les courants continu et alternatif ont tous deux leur place dans les commandes électriques. De telles demandes, qu'elles soient par l'entremise de groupes redresseurs ou de moteurs-générateurs, ont un effet tout aussi bien sur le voltage que sur la dorme d'onde à la source du courant.

In dieser Nummer

C.E.G.B. Netzüberwachung, I ... 667
Im Hauptverwaltungsgebäude der Central Electricity Generating Board in London sind zwei grosse Analogrechengeräte zür Netzuntersuchung und -Ueberwachung aufgestellt worden. Das eine davon ist ein Gleichstromgerät und dient der schnellen Durchführung von vorläufigen Untersuchungen. Das andere ist ein Wechselstromgerät, das bei Betriebs- und Stabilitätsuntersuchungen, Messwerte von höchster Genauigkeit liefert. Letzteres wird mit Wechselstrom von 1 000 Hz gespeist und umfasst 32 Generatormessplätze, 64 Belastungsimpedanz-Messplätze, 162 Leitungsimpedanz-Messplätze sowie 30 Autotransformatoren- und 24 Kopplungstransformatoren-Messplätze.

Kernkraftwerk Bradwell ... 677
Das Ein- und Austragen der Brennstoffelelemente im Kernkraftwerk Bradwell wird mittels einer einzigen, 400 Tonnen wiegenden, fergesteuerten Maschine bewerkstelligt. Die Belieferung dieses Kraftwerks mit Brennstoff hat bereits begonnen und man rechnet damit, dass das Eintragen des Brennstoffes in die Reaktoren ab März 1961 erfolgen wird.

Industrielle Gleichstromversorgung ... 679
Der industrielle Bedarf an Gleichstrom ist ein beträchtlicher und er erfordert die Verwendung von Gleichrichteranlagen, Leonardsätzen und ähnlichen Einrichtungen im grösseren Masstabe. In manchen Industriezweigen, namentlich im elektrochemischen, stellt der Gleichstrombedarf den grösten Teil des Gesamtstrombedarfs dar; in anderen, z.B. in Walzwerken, Bandstahlstrassen u. dgl. wird sowohl Gleichstrom wie auch Wechselstrom zu Antriebszwecken verbraucht. Eine hohe Inanspruchnahme durch Gleichrichter oder Motorgeneratorsätze gelieferten Gleichstroms wirkt sowohl auf die Spannung wie auf die Wellenform des Eingangsstroms zurück.

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Editor and Managing Director:
ROY BALDWIN, M.I.E.E., Barrister-at-Law

Joint Editor:
K. C. POUNDS, B.Sc.(Eng.), A.C.G.I., A.M.I.E.E.

News Editor:
T. W. WRIGHT

Comment

SERVICING CONTRACTS

GEC'S Nicholas Stacey is establishing a reputation for seldom speaking on electrical trading without saying something thoroughly thought-provoking. His latest subject has been the problem of servicing. With the electrical industry committed to mass production, with mass distribution and consumption and mass financing being energetically tackled, he sees mass servicing as the big remaining problem on the horizon. In this, of course, he echoes EDA chairman Mr T. E. Daniel, who, at this year's BEPC, was pointing out the growing liking of housewives for service contracts covering inspection and adjustment for an annual fee, and at the same time warning of the annoyance factor where possession of half a dozen major electrical appliances can mean half a dozen different service men calling a year. Mr Stacey thinks there is opportunity here for someone who is willing to come in with a standard-charges, standard-service schemes. Mr Daniel considers that the electricity boards are exceptionally well placed to offer such a service, with manufacturers still dealing with any repairs other than the simplest. What about practice elsewhere? Pilot schemes are now in operation in the USA, covering attention to all appliances of a large manufacturer, at a fixed charge. Their development will need to be watched. In this country, the increased activity of the Electrical Contractors' Association in retailing, together with the apparently greater flexibility of working of private retailers, may bring a challenge to the claim of the area boards for first choice in front line servicing. What is sure is that when such close students of the electrical scene discern a need so clearly as to push it in public, there is opportunity for someone willing and able to tackle undoubted difficulties and complexities in return for substantial rewards.

HYDRO IN ROUGH WATER

A double-pronged attack was opened last week on the plans of the North of Scotland Hydro-Electric Board, with two certainly vocal and perhaps influential organisations demanding a re-evaluation of the Board's plans. At root, the criticism is the old one: is hydro generation economic in terms of capital, or of social cost in interference with scenery? The facts are available for the cost question and they do not seem to leave great scope for debate. With hydro generation, some 95% of unit sent-out costs are attributable to capital. The range of station costs, £125 to £200/kW, gives 0·65d to 0·85d/kWh at station busbars. Today's best steam station can equal the lower figure, tomorrow's might better it if fuel prices remained unchanged—provided the distance from the pithead or oil refinery to power station

is small. But in North Scotland such distances are large, especially in the north east, where industry is concentrated, and in the crofting areas, where distribution schemes bring hope of rehabilitation. If thermal stations in the south are to be relied on for northern supplies, then substantial transmission costs must be faced. These will soon hoist the apparently favourable thermal station economics nearer the hydro levels. Even in the comparatively easy transmission routes of England a double-circuit 275 kV line to give 550 MVA firm transmission capacity costs £25,000/mile, about £4 10s/kVA/100 miles. The cost of terminal equipment must be added and transmission losses capitalised for the hundred-miles transmission that would be needed for south to north power flows. In fact, the pattern of energy demand fits in well with nuclear base-load generation (having low fuel transport costs) and hydro back-up, with capital cost lessened because it will no longer be necessary to squeeze out the last expensive kWh of dry-year firm energy through extending storage capacity. That, then, is the technical background to demand for a new inquiry. But there is a political angle as well. All of this has already been looked at in detail by MPs, who, through the Select Committee on Nationalised Industries, gave the N of S HEB a most satisfactory report. If that Committee is to mean anything, then a renewed look at North of Scotland plans cannot easily be granted.

RAIL ELECTRIFICATION DITHERING

Railway finances are again causing concern at Ministerial level. There is nothing new in that, but last week's debate in the House of Commons indicated that the Minister of Transport has been driven to decisions on the subject that are of direct importance to electrical manufacturers. As part of yet another reappraisal of British Transport Commission's plans for the railways, contract placing for the Euston-Birmingham-Crewe electrification is to be brought to a stop, although existing contracts are not to be affected. The implication is that plans to electrify this part of the railway system may be abandoned or placed in cold storage, the place of electric locos being taken by diesels. This seems a decision occasioned by political cold feet. Even if it is thought that the original decision against dieselisation was wrong, on a narrow economic basis, preparation for electrification has gone so far that the only sensible step to take is to press ahead with it as fast as practicable so that a financial return may start being earned on the investment already made. That was the view of the Parliamentary Select Committee whose critical report was largely responsible for last week's debate. It must also be the opinion of all who study the problem away from the pressures of political expediency. In fact, in the long run electrification looks right, granted that some sort of railway scheme is going to be retained for the foreseeable future (and that is explicit Government policy). The heavily loaded London - Birmingham - Crewe - Manchester-Liverpool main line is a natural for electrification. As the designers of the BTC modernisation plan put it, after predicting that either dieselisation or electrification would pay from the commercial aspect, "in many ways electricity is the ideal. On the lines of heaviest traffic the potential economies are less with diesel traction than with electrification."

CONTROLLABLE LOADS

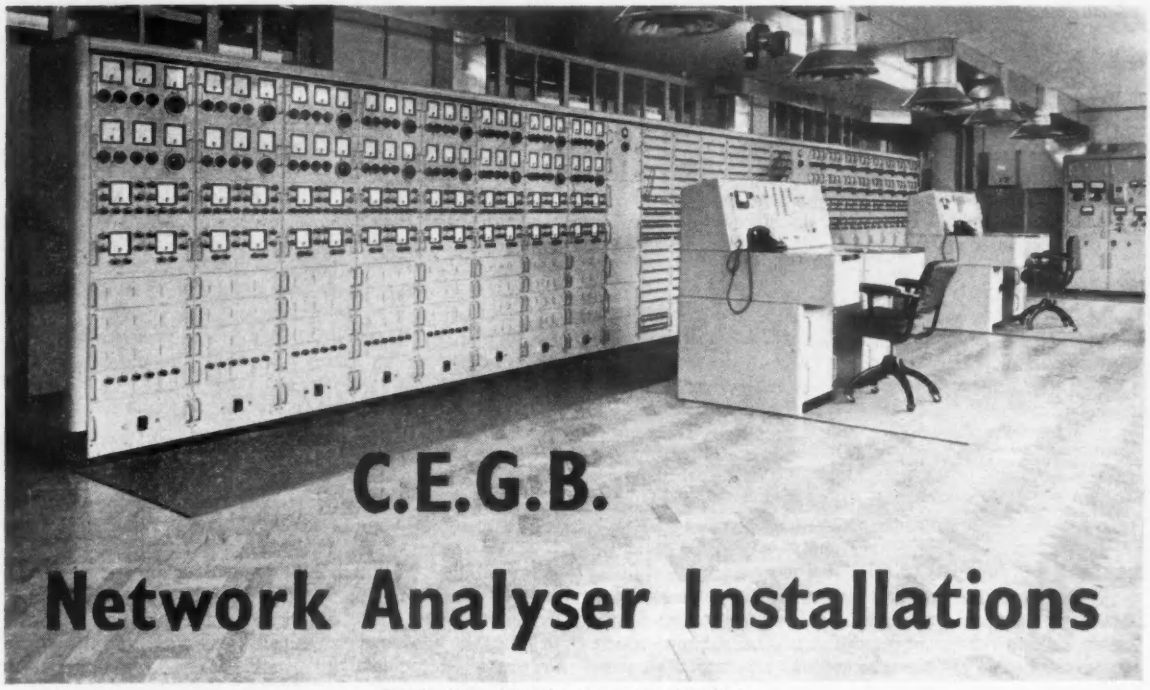
That an unlimited supply at the declared voltage and frequency should always be available is an attractive ideal for electricity supply, but it is far from being an aim in the economic interests of the consumer. The increase in interest in providing for interruption of suitable supplies at short notice is a rapidly growing auxiliary to the broader brush of off-peak loading as a means to matching lower cost electricity to load possibilities. The predictions of South Wales EB speakers at the recent EDA Industrial Sales Conference are notable in this respect. They envisage between 150 MW and 200 MW of controllable load in the area in a few years' time, compared with an area board peak demand of about 1,500 MW. That represents a prize worth sustained effort.

ANALOGUE ADVANTAGES

Digital computers offer so much in sheer speed of computation today that the time-consuming business of programming them for given tasks tends to be discounted, with the consequence that analogue devices are readily regarded as outmoded. In the specific field of electrical network analysis, however, the case is not proved. The conventional network analyser in one of its forms still competes effectively with the electronic digital computer. The article which begins opposite looks in detail at the network analyser facilities which are now available at CEGB headquarters. Installed there are a d.c. analyser, used for the first essay in a study, and a highly refined a.c. analyser which offers greater precision and more flexibility of application. Speed of setting up and operation are the criteria of success of instruments of this nature, and in consequence a large number of aids to the operator has been built into the a.c. equipment. Yet it is still capable of significant extensions in this respect, for instance by incorporation of automatic balancing. This can go far to offset the greater speed of the digital computer in the actual computational process. There is another factor in favour of the analogue computer in the system engineering context. It keeps the problem at least perceptibly associated with the physical and geographical shape it assumes in practice, and this makes it a more educational and perhaps more congenial instrument for the engineer than the digital computer.

Meteor

This week's quick summary of electrical news faces advertisement page 20



C.E.G.B. Network Analyser Installations

Fig. 1, above, shows the a.c. analyser installation

PART 1. HEADQUARTERS INSTALLATIONS

by A. W. Hales,* A.C.T.(B'ham), A.M.I.E.E., A.M.Brit.I.R.E.

As a consequence of the nationalisation of the electricity supply industry in 1948 and the creation of the then British Electricity Authority, a more unified approach to the design and development of the high voltage transmission system within the Authority's area became possible. This situation, together with two other factors (the continued growth in the demand for electricity during the post-war years and the necessity for overtaking arrears in system expansion occasioned by the limited amount of man power and capital that was available for this purpose during the war years), resulted in an intensification of activity in the sphere of high voltage transmission system design. Additionally, modern developments in turbo-generator and ancillary plant, e.g., excitation systems, automatic voltage regulators, etc., combined with the growing importance of system loads of a hitherto unusual character (e.g., large arc furnaces, nuclear fuel processing installations, colliery winding equipment, etc.) occasioned an increase in the volume of analytical work that was required to be undertaken in evolving suitable transmission system designs.

Some indication of the degree of expansion in the electricity supply industry, with particular reference to transmission equipment, is shown in Fig. 2, which depicts the annual growth in installed generating capacity, grid transformer capacity and overhead line route miles for the decade 1949-1959. In assessing the extent of the trends, it should be noted that the data does not include that of the South of Scotland Electricity Board, which was created in 1955. The influence of the additional problems created by post-war developments and increased complexity of interconnection of the high voltage system demonstrated the necessity for the enlistment of such computational aids as existed in the work of the then Authority's transmission design branch. The use of such computational facilities for transmission design work, which already existed in certain large electrical manufacturing organisations and elsewhere, showed a progressive increase which was maintained with the passage of time.

* Mr Hales is with CEGB Headquarters.

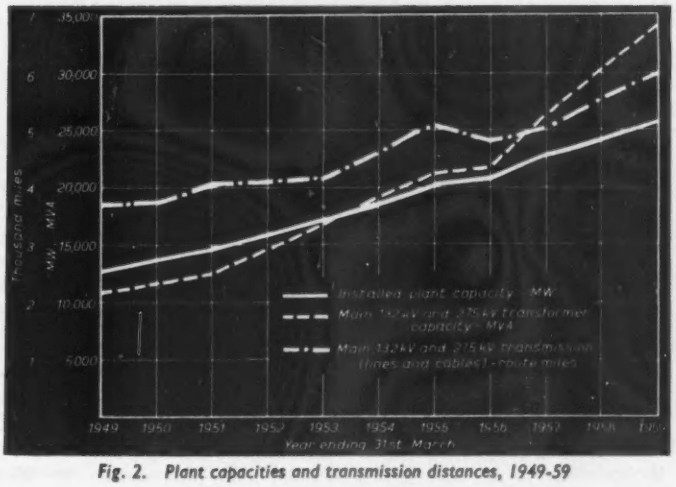


Fig. 2. Plant capacities and transmission distances, 1949-59

Accordingly, in 1952 it was decided to embark upon a programme of network analyser development and construction in order to equip the transmission design branch at headquarters with both d.c. and a.c. network analyser facilities. This programme was subsequently fulfilled, together with an additional and later programme which related to the development and production of 50 c/s a.c. network analysers[1] which were intended more particularly for use within the regions, divisions and area boards. In the case of the latter, there was a considerable number of d.c. network analysers, mostly of differing design and construction in operation. The individual designs were calculated to serve best the local and sometimes specialised applications for which they were built, but such is the diversity of design, etc., that it is impracticable to comment at length, and it is not proposed to deal with these equipments in these articles.†

Concurrent with the above-mentioned projects there have been other successful developments directed towards the production of economic a.c. network analyser equipments, which supplement the equipments described herein. It is not, however, proposed to discuss these developments since they have already been treated elsewhere.[2,3]

The functions of the headquarters equipments are essentially complementary, the d.c. analyser being employed for rapid studies of a preliminary character not requiring maximum precision and data, but which nevertheless serve to formulate ideas on the probable course of development of a transmission scheme. Following preliminary studies on the d.c. network analyser, a convergence of ideas and possibilities on a particular study is possible and once the broad outline of a feasible or preferred system is known the study can then be transferred to the a.c. network analyser for a more comprehensive treatment having a higher order of precision if such a course is considered necessary.

D.C. Network Analyser

This was the first equipment to be completed and was designed primarily for the determination of transmission system power flows and fault currents. Additionally, it can be used for general network reduction purposes, for circuit-breaker and protective gear application problems, for fault location purposes and for line outage studies. The analyser may be used for fault studies by applying methods based upon symmetrical component theory, where the configuration of the interconnected sequence impedance networks permits the system equations to be completely satisfied. Various techniques to extend the application of this type of analyser have been evolved.[4,5]

The analyser, an illustration of which is shown in Fig. 3, is of the resistance type, being energised from a d.c. source and completely universal in application. The principles of the d.c. current distribution, etc., in passive networks of this type as applied to a.c. power system analysis have long been established and employed, and it is sufficient here to say that they are primarily based on the following two simplifying assumptions:

1. That all system e.m.f's are equal both in respect of phase and magnitude, and
2. That all system impedance phase angles are equal (in the usual case equal to 90°).

In those systems where the series impedances have a predominantly reactive character, as is the case with the Board's high voltage transmission system, it is often sufficiently accurate to represent the complex system impedances by equivalent resistances which represent, to some scale, the actual inductive reactive elements. With the equipment X/R ratios commonly encountered, the error introduced by this simplification is of the order of 5%, i.e., current values are increased in magnitude by approximately 5%.

In this analyser two separate passive networks are incorporated, one being for use in power flow studies, and the other for use in fault studies. This feature is necessary if optimum scaling of the networks is to be achieved when using a common supply voltage for both types of study. For this reason the ratio chosen between the network scaling factors is 100:1, the individual network scaling factors being as follows:

(a) Power flow studies: 5 ohms=1% reactance on 100 MVA base, and

(b) Fault studies: 500 ohms=1% reactance on 100 MVA base.

The corresponding current relationships in the two networks are: 1 milliampere=1 MW and 1 milliampere=100 MVA, respectively.

For condition (a) above the passive network is energised from a d.c. three-wire 50-0-50 V supply, whilst for (b) a similar two-wire 50 V supply is used. From Fig. 2 it will be seen that the analyser consists essentially of two main groups of equipment:

(1) An in-line arrangement of racks containing various types of functional unit as follows:
   (a) network infeed units.
   (b) network universal impedance elements.
   (c) central unit termination and interconnection panels.

(2) Two metering and control consoles.

The upper halves of the extreme left- and right-hand sections contain the network infeed units, whilst the corresponding lower sections contain the network universal impedance units.

Functional Units

A network infeed unit consists of a switched resistor network in parallel with a potentiometer. The former contributes equal increments of network current, whilst the latter provides a continuous adjustment between the incremental values. The parallel resistor group is connected in series with a milliammeter, the latter giving a continuous indication of infeed current magnitude. A selector switch permits a unit to be selected for one of three functions.

(1) As a "generator" or fault unit.
(2) As a "load" unit, or
(3) For presetting calibration.

The position (3) provides a rapid initial calibration feature with the unit energised at the nominal supply voltage. The total range of infeed is equivalent to 0-150 MW or 0-1,500 MVA for the load and fault networks, respectively. A 1 ohm precision shunt is permanently connected in series with each unit for network measurement purposes.

The universal impedance units contain two separate groups of resistor networks comprising three decades each, a panel switch providing group selection. The total range traversed by these units in 0·1% increments is equivalent to 0·99·9% reactance on 100 MVA base. The unit calibration is directly indicated in terms of per cent impedance on 100 MVA base by rotating dials at the rear of the panel. All the resistive components have a nominal tolerance of ±1%. A 1 ohm precision shunt is connected

† The series will comprise three articles outlining the general conception of the design and construction of three separate classes of equipment, namely, the d.c. and a.c. network analysers located at the Board's headquarters and the numerous 50 c/s a.c. network analysers which are now in service in various regions, divisions and area boards, etc., throughout the country.

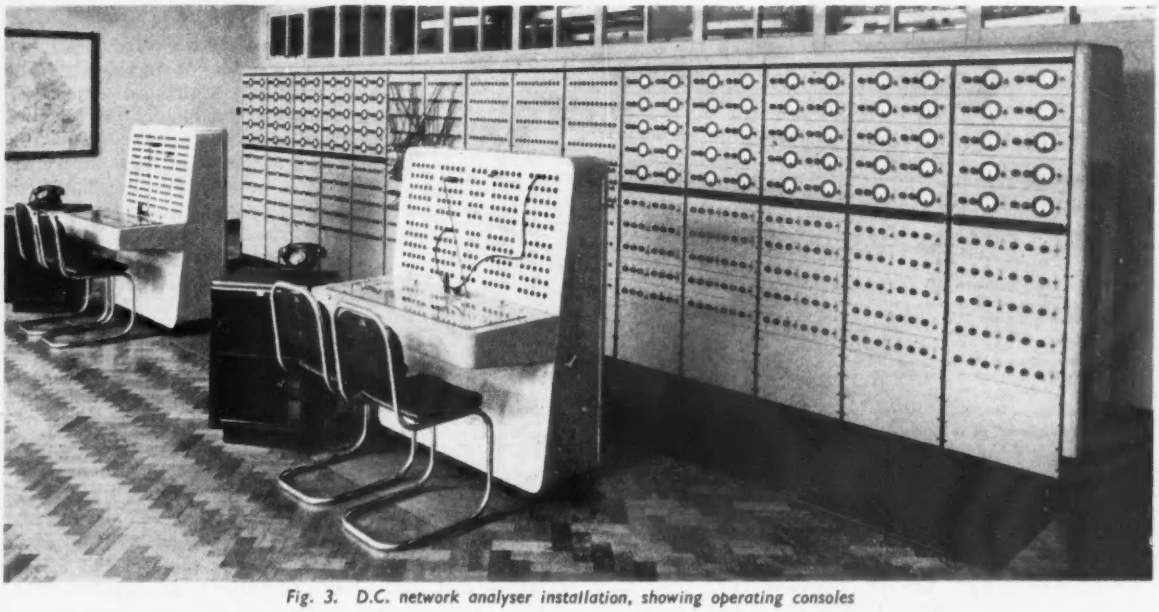


Fig. 3. D.C. network analyser installation, showing operating consoles

in series with each unit for network measurement purposes.

The centre section of the main equipment racking contains the facilities necessary for unit terminations and their interconnection to form any desired equivalent system network. Any two termination sockets on the main interconnection panel may be connected together by positioning them in adjacent plugs. In this way, sections of analyser bus may be constructed as necessary. A space of one vacant plug serves to isolate one section of bus from another. Designation strips are provided for the identification of system locations.

Metering and Control Facilities

All network measurements are effected at either or both of the metering and control consoles. The analyser may thus be operated as two indepedent channels or as one composite unit as required. All network current measurements are obtained by measuring the millivolt drop developed across the precision shunts referred to previously. For current measurements, two precision grade centre-zero (5-0-5 millivolt full-scale deflection) millivoltmeters are employed. The ranges of measurement available are as follows:

Power Measurement	Range 1	50-0-50 MW
	Range 2	250-0-250 MW
	Range 3	1,250-0-1,250 MW
Fault Power Measurement	Range 1	500-0-500 MVA
	Range 2	2,500-0-2,500 MVA
	Range 3	12,500-0-12,500 MVA

Connection to the functional unit shunts is effected manually on the inclined panels of the control consoles, shown in Fig. 3. By using two instruments, the total fault power and a single branch fault power contribution may be obtained simultaneously. A system of coded interconnection plugs used in conjunction with an instrument deflection convention enables the direction of current flow in a network unit to be determined readily from the centre-zero instruments. A voltmeter is incorporated for the measurement of supply voltages and the voltages developed between specified nodes in the interconnected network. Facilities are included for the energising of special-purpose isolated networks, e.g., complex networks requiring reduction. Groups of pre-calibrated, fixed infeed units of extended range are included for use in studies which would otherwise require the use of multiple standard infeed units in parallel. With these units single loads of up to 1,000 MW or fault powers up to 10,000 MVA may be obtained directly.

Power Supply

The analyser is supplied from two constant potential metal rectifier units connected in series so as to provide a three-wire d.c. 50-0-50 V supply for the fault network. They have a current rating at nominal voltage of 1,500 milliamperes, the ripple content of the output voltage being approximately 0·5% at a current of 1,000 milliamperes.

A.C. Network Analyser

The development and construction of the a.c. analyser followed chronologically on the commissioning of the d.c. network analyser, and several operational features incorporated in the latter which experience indicated were of merit were included in its design. An illustration of the analyser is shown in Fig. 1, which indicates the compact and logical layout which has been achieved. Like its d.c. counterpart it is designed for dual channel operation and essentially constitutes two separate network analysers. Its complement of functional units (divided equally between the two channels) is as shown in Table 1. The design and construction of the main equipment was preceded by the development of a "pilot" section which was used as the basis of the final design. Much valuable information was obtained in this way which proved to be of considerable value in the later work, even though the ultimate performance of the final equipment could not be gauged in all particulars until its construction had been completed.

Fig. 4 indicates in schematic form the disposition of the equipment, and from this it will be seen that the primary source of supply (1,000 c/s) is an oscillator unit. The output of this is fed into a phase conversion unit having a two-phase output, this providing the input signal for two power amplifiers whose load consists wholly of Magslip resolver stator windings. The resolvers are used

Table I. Analyser unit facilities and ranges

Type of Unit	Total Number Installed	Range	Increment
Generator	32	Phase Angle 0 - 360° Output voltage 0 - 2·5 per unit Output Current 0 - 6·25 per unit	Continuously Variable
Load Impedance ...	64†	Real Power 0 - 2·09 per unit Reactive Power (Lagging) 0 - 2·09 per unit Reactive Power (Leading) 0 - 0·99 per unit Autotransformer ratio 1 : 0·80 - 1·20	0·01* per unit 0·01* per unit 0·01 per unit 0·01
Line Impedance ...	162	Resistance } Series Inductance } Individual calibrated units selected for given total value Capacitance-Shunt	— — —
Autotransformer ...	30	Voltage Ratio 1 : 0·80 - 1·20 Resistance } Series Inductance } Individual calibrated units selected for given total value	0·01 — —
Coupling Transformer	24	Various Ratios 1 : 1 (16) 1 : √3(4) 1 : 2(4)	—

* Except between 1·00 and 2·00 per unit positions. † Leading reactive load facilities on 32 units only.

in this instance purely as sources of continuous phase shift. The variable phase voltage, derived from the rotor of each resolver, provides (via a variable attenuator network) the input for the respective generator unit amplifiers —which feed directly into the passive complex impedance network. Various ancillary features are also included for maintenance, setting operating levels, etc., in the 1,000 c/s supply chain.

The base operating or one per unit values of the analyser are as follows:

Voltage: 25 volts	Impedance: 500 ohms
Current: 50 milliamperes	Admittance: 2 millimhos
Power: 1,250 milli VA	Frequency: 1,000 c/s

For convenience the applications of this type of direct impedance analyser may be itemised as follows:

(1) Operational studies on systems under "normal" conditions.

(2) Operational studies on systems under specified fault conditions.

(3) Steady-state stability studies.

(4) Synchronous machine transient stability studies by the step-by-step method.

(5) Asynchronous machine stability studies.

(6) Non-electrical problems which can be solved by an electrical analogue.

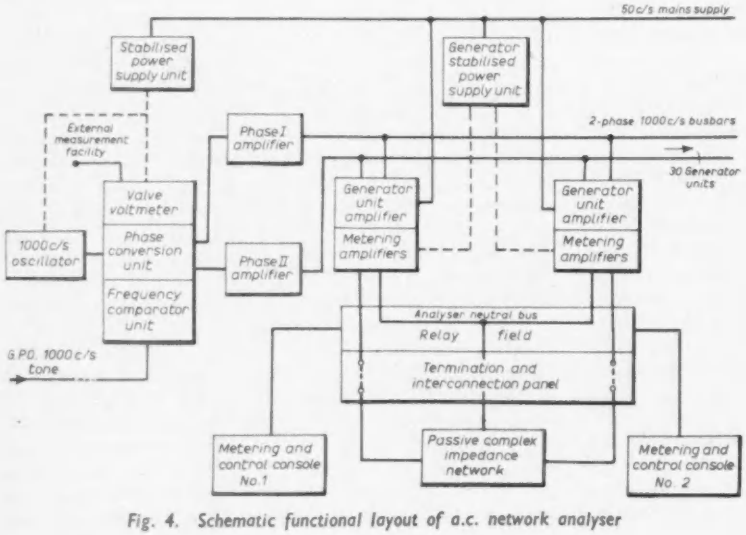


Fig. 4. Schematic functional layout of a.c. network analyser

From Fig. 1 it will be seen that the functional units are located in an in-line arrangement of racks, together with a central termination and interconnection field assembly, the various power supplies for the analyser being located in two separate racks shown in Fig. 6. All network measurements are effected at one or both of the control consoles shown. (See Fig. 1.) From these consoles any specified unit may be selected for measurement by means of a remote circuit selection system. In addition to the main instrumentation facilities provided, separate phase angle measuring equipment is incorporated for the continuous measurement of the circuit power factor.

In its present phase of completion, the analyser has manual adjustment of generator unit output voltage phase and magnitude—the question of the desirability and means of automatising these functions being deferred until a later stage. The complete analyser contains 522 valves and has a mains power consumption of approximately 9 kW. For environmental reasons it is located in an air-conditioned room, having its own self-contained air-conditioning plant. The plant has a nominal capacity of 4,000 cu ft/minute and is specified to maintain the ambient temperature at 70°F±1°F with a maximum relative humidity of 60% under all expected extremes of seasonal conditions. The installation incorporates both glass wool filters and electrostatic precipitation plant in order to reduce the deposition of dust in the equipment, the latter operating at a nominal voltage of 12 kV d.c.

Outline of Equipment and Performance

The selection of the nominal base operating quantities was, as is usual in such cases, a considered compromise between many conflicting factors. The availability of magnetic materials, the design of amplifiers and instrumentation equipment, the physical size of network components, the effects of stray electromagnetic and electrostatic coupling, etc., were some of the important points requiring assessment. It is sufficient to note that the operating frequency of 1,000 c/s was chosen because it reduced the physical size of the reactive network components to acceptable proportions, was sufficiently low so as not to introduce significant effects on performance and accuracy due to parasitic coupling, and had the merit of being easily verified by comparing it with the GPO 1,000 c/s standard tone.

Generator Units

A schematic of a generator unit is shown in Fig. 5, from which it will be noted that the main element is a high-performance feedback amplifier with which is associated a composite metering system giving direct indications of real and reactive power output at the unit terminals. The amplifier has both negative voltage and current feedback applied overall, the latter permitting the attainment of a virtual zero output impedance under

conditions of unity power factor load. Variations in output impedance under normal designed loading conditions are such that it traverses the range 0-1,250 milliohms for power factors between zero lag and lead. The total amount of feedback applied is approximately 26 dB. The adjustment of output voltage is effected by a switched attenuator network having for its fine control a ten-turn helical potentiometer. This attenuator network precedes the main amplifier and is energised from the rotor circuit of a Magslip resolver having two-phase stator and rotor windings. Independent variation of phase of output voltage is effected by the resolver through the range 0-360°. Its rotor is driven via a slow-motion dial assembly having ratios of 50:1 and 1:1, respectively. It incorporates a vernier scale, thus permitting an angular resolution of 0·1° to be obtained.

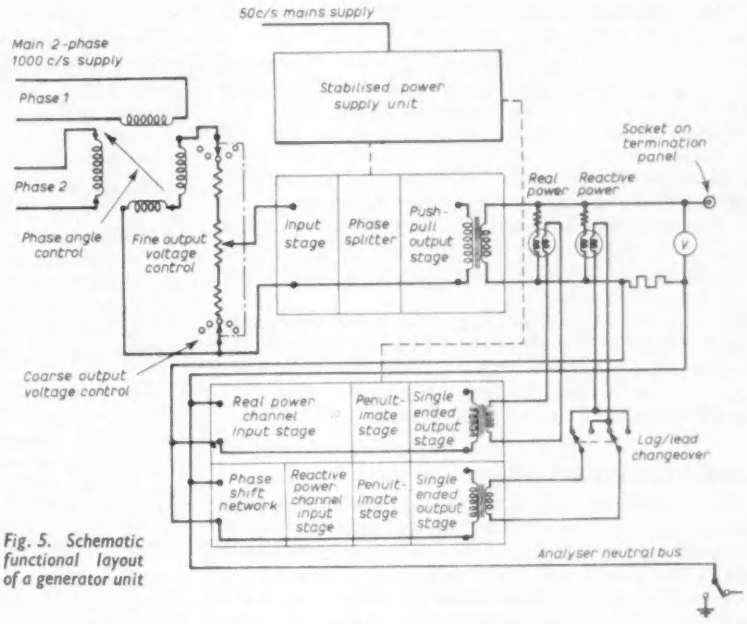


Fig. 5. Schematic functional layout of a generator unit

The main amplifier output stage operates in Class A push-pull and is capable of delivering a total power output of 12 watts with a total harmonic distortion level of less than 0·1%. The power output available at the generator terminals is less than nominal by the amount consumed by the wattmeter and varmeter shunt operating coils.

The ancillary metering amplifiers comprise two virtually identical channels, i.e., for real and reactive power measurement, respectively, the latter differing only in that it has additional phase shifting circuits. Both amplifiers have identical single-ended output stages (6 BW 6) with overall negative current feedback applied over the output and penultimate stages. As a consequence, they have a relatively high output impedance (3,700 ohms). This high value of output impedance minimises the errors due to the finite mutual coupling that exists between the fixed and moving systems of the dynamometer type indicators.

Facilities are provided in these units for the insertion of mobile circuit monitoring equipment to assist in their rapid servicing. For analyser studies requiring the representation of various forms of generator internal impedance, a unit is used in conjunction with a line impedance unit.

Line Impedance Units

These units are constructed in drawer form, each containing three line impedance units and mounted on telescopic runners. Each drawer contains six rows of nylon-loaded P.F. octal type valve holders—two rows per line impedance unit—these being interconnected so as to receive plug-in impedance elements of three basic types, i.e., series resistance, series inductance and shunt capacitance. The mode of interconnection ensures that all series and shunt connections are formed automatically. With this system a wide range of equivalent circuits having a correspondingly wide range of constants can be assembled since the insertion sequence of impedance elements is entirely flexible. It is thus possible to cater for special cases, e.g., induction motor equivalent circuits, as circumstances require. Unit designation labels for recording the constants of the equivalent circuits are provided on the front panels. Initially, the impedance element constants were selected so as to cover the commonly expected range of system constants, though as experience and changing circumstances indicate, new values can be added. The nominal values of the impedance elements contained in the initial installation are as shown below:

(a) Resistance: 0·001, 0·002, 0·003, 0·004, 0·005, 0·006, 0·007, 0·008, 0·009, 0·01, 0·02, 0·03, 0·04, 0·05 per unit.

(b) Reactance: 0·001, 0·002, 0·003, 0·004, 0·005, 0·006, 0·007, 0·008, 0·09, 0·10, 0·20, 0·30, 0·40, 0·50, 0·60, 0·70, 0·90, 1·00 per unit.

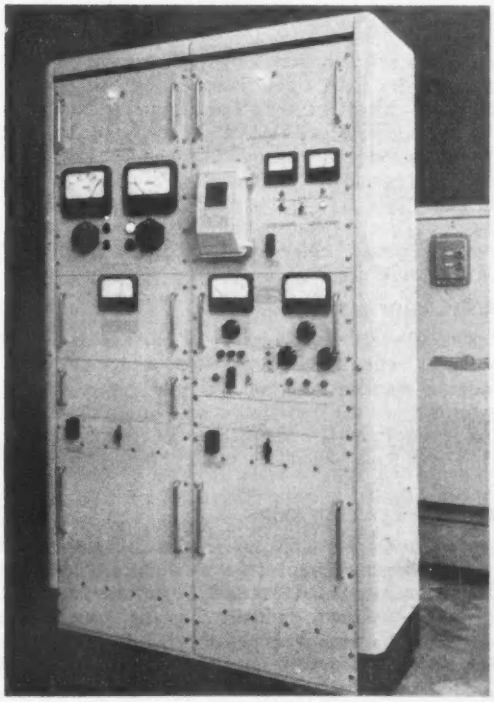


Fig. 6. Power supply equipment for a.c. analyser

(c) Susceptance: 0·001, 0·002, 0·003, 0·004, 0·005, 0·006, 0·007, 0·008, 0·009, 0·01, 0·02, 0·05, 0·10 per unit.

The resistors and capacitors are of the wire-wound and silvered-mica types, respectively, having a nominal tolerance of ±1%. The inductor design is based on pot core assemblies using Ferroxcube as core material. The core size employed enables the range of inductance values envisaged to be adequately covered whilst at the same time permitting an acceptable Q level to be maintained. The specified inductance tolerance in the working current range up to 312·5 milliamperes is ±1% of the nominal value, whilst the Q values range from 15 to 35 depending upon inductance value.

When not in use the individual impedance elements are stored in three mobile racks adjacent to the analyser. One of these racks includes a mobile circuit monitoring equipment for the routine checking of generator and power amplifier unit valve operating conditions.

Load Impedance Units

These units furnish facilities for real and reactive power representation in the network, half the units (32) catering for both lagging and leading reactive power conditions. The facilities and respective ranges covered by these units are given in Table 1. The actual parallel-connected load impedance branches are supplied from the primary of an autotransformer which has a tapping range, in 0·01 per unit increments, of 0·80 to 1·20 per unit volts with a secondary voltage of 1·0 per unit. The voltage across the combined load impedance is monitored by a suppressed zero voltmeter having the same nominal voltage range as the primary winding of the autotransformer. The resistive branches of the impedance are switched ranges of carbon or wire-wound resistors (depending upon ohmic value) having a nominal tolerance of ±1%. The inductive branches employ two Ferroxcube pot core assemblies having multi-tapped windings. The Q value at any tapping covers the range 32 to 122 depending upon inductance value. Where fitted, the capacitative branches comprise switched banks of silvered-mica capacitors, also of ±1% tolerance.

The autotransformer core assembly is also of Ferroxcube —being formed from eight U-shaped sections. The small magnetising current of each transformer is compensated by an individually selected shunt capacitor connected across the secondary winding. The no-load loss at unity ratio is approximately 1 milliwatt.

All indications on a unit, e.g., load settings, transformer ratios, etc., are by means of rotating engraved dials positioned directly behind apertures in the front panel.

Autotransformer Units

Constructionally these units are similar to the line impedance units and utilise the same principle of impedance element insertion for the representation of transformer leakage impedance and no-load admittance.

The transformers are identical in all respects with those used in the load impedance units.

Coupling Transformers

These transformers are provided for the interconnection of system sequence impedance networks in fault studies where simultaneous system faults or other applications involving inter-circuit mutual magnetic coupling arise. Three ratios are employed, namely: 1:1 1:√3 and 1:2.

The design of a transformer for this function is essentially a compromise, for though they should be "ideal," i.e., possess zero losses, have zero leakage impedance and no inter-winding or inter-turn capacitance, a practical design must clearly fall short of the ideal. Design investigations resulted in the selection of Ferroxcube as core material and this, together with the choice of a liberal nominal rating, has enabled a satisfactory design to be evolved, without having recourse to the inclusion of loss compensating equipment.

Having regard to the general conditions which obtain in most applications of these transformers, it was not considered economically justifiable to incorporate ancillary loss compensating equipment. The transformers are, however, compensated for magnetising current by shunt capacitors. The windings, which are of circular section enamelled copper, are sectionalised to reduce leakage reactance to an acceptable minimum.

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(The next two articles in this series will deal with instrumentation of the analysers described and with analysers in CEGB regions and divisions and at area boards.)

CARRIER PROSPECTS

FUTURE prospects for the more and more compact handling of messages in telecommunications carrier systems were discussed by the IEE Electronics and Communications section chairman, Mr. T. B. D. Terroni, B.SC., M.I.E.E., in his inaugural address last week. His background was the international agreement, aimed at securing good quality speech transmission over circuits up to 2,500 km long. This implies provision of speech circuits having controlled response over the band 300 to 3,400 c/s, so that speech channels of 4 kc/s nominal bandwidth can be assembled in blocks of 12 in the frequency range 60 to 108 kc/s. These basic groups are built up into supergroups of 60 channels, which are next assembled into blocks of 300 channels to form a mastergroup, and then a 900-channel supermaster group covering the frequency range 8,516 to 12,388 kc/s.

Many techniques are brought into play to secure this compression of information. Looking to the future, Mr Terroni discusses in particular time sharing rather than wavelength sharing, with special attention to pulse code modulation. The aim of this technique is to send high-speed telegraph pulses to represent speech. The pulses are obtained by sampling the speech amplitudes at a frequency equal to at least twice the highest speech frequency to be transmitted, i.e., 8,000 c/s. The instantaneous amplitudes thus determined are transmitted in code as digits of a binary system. Such a system would be less liable to interference than with other methods, and cable requirements are less stringent.

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Late Deliveries

AS my company purchase a considerable quantity of equipment, both electrical and mechanical, and experience considerable delays in construction due to delivery promises being repeatedly broken, I was somewhat amused to read the reply by BEAMA to the Australian High Commissioner's comments regarding this very serious disease which British industry is at present suffering.

My company could supply BEAMA with many examples of broken delivery promises, but the following probably illustrates my point very clearly.

An order was placed with a very large concern for some starters. The order was dated February and the delivery promised within 26 weeks. Our progressing section extracted the following information during the year:

April—Confirmed delivery end of July.

May—A letter was received confirming 5 August delivery.

End of July—We are told no "accurate" date of despatch available. At this stage this equipment is urgently required on site and it is being constantly progressed.

End of August—Definitely promised on site by end September.

Early September and throughout September—Confirmation received end September delivery.

End of September—Despatching 4 October.

4 October—Despatching 7 October.

7 October—Manufacturer finds he is unable to fit one starter above the other on the busbar chamber.

Eventually delivery was effected by special transport on 15 October.

As a patriotic Englishman I view complacency on the part of responsible associations with great concern, and shudder to think how we are going to stand up to the economic breeze, which no doubt will develop into a fairly strong gale, when the Six and Seven finally get together.

H. J. Wilson, M.I.MECH.E.,
CHIEF CONSTRUCTION ENGINEER,
MONSANTO CHEMICALS LTD.,
LONDON S.W.1.

Jumping for Safety

I FOUND your recent article on industrial safety very interesting. H.M. Inspectors of factories suggested fitting d.p. switches and insulated handles to portable apparatus, especially to protect workers who are at some distance from others. This is a step in the right direction but meantime the danger remains. May I be allowed to place before you this small further contribution to industrial safety.

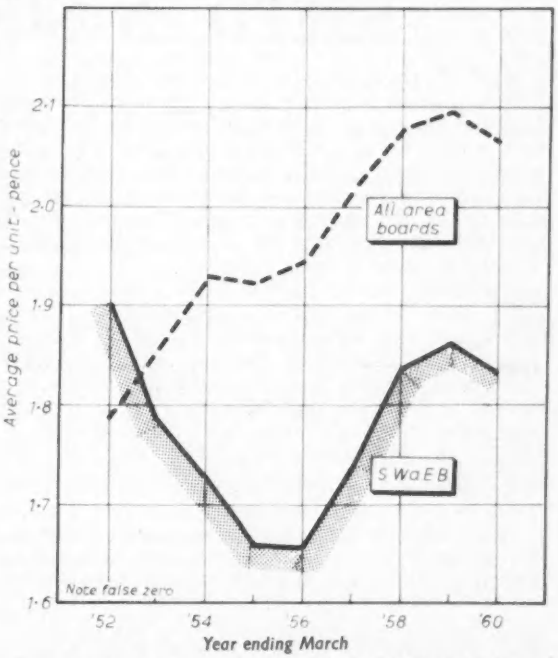
While working alone I became attached to live portable apparatus. Being of a rather placid nature, I put in some rapid thinking as my personal survival became more and more important. At the moment when I had decided that having made my living by electricity, it was probably right and proper to die by electricity, I had an inspiration. My fingers, of course, would not open as long as electricity flowed through hand, body and feet to earth. Through feet to earth? At this point I had found my answer. My feet were not paralysed, all I had to do was to leap in the air, stopping the current to earth, and so be able to open my hand. The answer is so simple that I almost cringe as I write it down as I have spent a lifetime in the electrical industry. I have noticed that most people who receive an electrical shock under similar circumstances fall to the ground during the fight to free themselves. It is of first importance in public safety that employees when in danger must stay upright and so be ready to be "One jump ahead of danger."

At all factories and even homes a campaign should be run by poster and slogan (as above) to drive this simple means of escape home.

C. McAllister,
GLASGOW.

Charges for Commercial Supplies

IN the Editorial in your issue of 20 October, 1960, you refer to the fact that: "In the case of South Wales, the commercial revenue per unit was actually less in 1959-60 than in 1951-52." While this statement is true, the inference which you draw is rather misleading. To put the matter in proper perspective it is necessary to consider what happened in the intervening years.



Average revenue per unit sold for South Wales EB and all areas

The accompanying diagram shows the average revenue per unit sold for commercial purposes during each of the years 1951-52 to 1959-60, inclusive, for the South Wales EB, and also for all area boards combined, and it will be observed that during the past four years of the period under review the curve for South Wales follows very closely the shape of the curve for all area boards.

The Board's first standard charges for commercial supplies came into operation on 1 April, 1952, and the average price of 1·903d during the year 1951-52 was that yielded in the last year during which the 94 separate commercial tariffs of the vested undertakings were in operation.

During the three years following the introduction of standard tariffs, there was a substantial increase in the average annual consumption of commercial consumers. The reduction in the average revenue per unit sold for commercial purposes during those years was undoubtedly the result of the considerable increase in the proportion of units sold at the final or follow-on rate.

Although during the next three or four years the proportion of follow-on units continued to increase (but at a lower rate) the effect of this was more than offset by tariff increases and by increases in the cost of fuel via the fuel adjustment clause of the commercial m.d. tariff, with the result that the average price per unit increased.

During the two years 1958-59 and 1959-60 there was no significant change in the cost of fuel in South Wales, nor was there any other disturbing influence, with the result that there was very little variation in the average revenue per unit sold during these two years. The slight fall in 1959-60 can be ascribed to the fact that the proportion of units sold at the follow-on rate during the year rose appreciably.

As you are no doubt aware, in order to cover increased costs the South Wales EB published new tariffs which became effective on 1 October, 1960, and the changes in the commercial tariffs are such as will yield an appropriate contribution towards the Board's increased expenses.

In conclusion, I cannot accept the implication in the last sentence of your article that the average revenue per unit of commercial supplies should necessarily move year by year uniformly with that of other classes of consumers. A great deal depends on the load factor and the peak coincidence factor in the respective classes. Nor is there any reason why the average price per unit of a particular class should not move in a downward direction. Provided the final unit price in the tariff adequately covers the cost of the incremental consumption which it attracts, a progressive reduction in average revenue per unit sold indicates that the tariff is promotionally sound.

A. J. Dalton, A.M.I.E.E.,
CHIEF COMMERCIAL ENGINEER,
SOUTH WALES ELECTRICITY BOARD, CARDIFF.

Meteor did not wish to imply, as Mr Dalton suggests, that "average revenue per unit of commercial supplies should move . . . uniformly with that of other classes." The phrase used was "little justification for this falling behind of yield on commercial units." This was intended to suggest that such factors as those mentioned by Mr Dalton were not sufficient to account for the smaller rise in revenue per unit on commercial supplies.—ED.

SPEED IN NUCLEAR SAFTEY

ONE of the problems of the nuclear energy industry is to check whether equipment or people have been irradiated above a given level. A "sequential" test procedure is often used, in which the time for which the test is applied is not fixed, but depends on the results obtained. This is appropriate since the generation of charged particles due to radioactivity is a random process, and the necessary size of sample for a given accuracy cannot uniquely be stated in terms of time.

One aspect of such measurements is discussed in a paper* read before the IEE Measurement and Control Section last week. The particular application involved is monitoring radioactivity on the hands of nuclear workers. Many pairs of hands have to be tested in a short time at the end of a working shift. Most are expected to be uncontaminated or only very lightly contaminated. An efficient test procedure should allow hands with little radioactivity to be tested rapidly, and the same applies to any heavily contaminated hands. Only hands whose radioactivity seems to lie close to the tolerance level needs to be tested in a period long enough to give high degree of statistical accuracy.

* Paper No. 3258 "Rapid Methods for Ascertaining Whether the Activity of a Weak Radioactive Sample Exceeds a Predetermined Level" by E. H. Cooke-Yarborough, M.A., M.I.E.E., and R. C. M. Barnes, B.SC.(ENG.), A.M.I.E.E., (UKAEA).

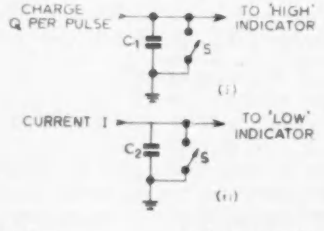


Fig. 1. Usual hand monitor technique. (i) basic counting circuit; (ii) basic timing circuit

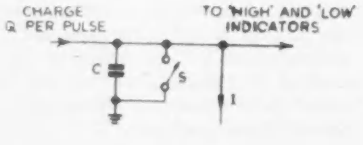


Fig. 2. Principle of difference integrator type of hand monitor circuit discussed in article

Old Design

Most existing monitors have used the type of circuit shown in Fig. 1. Counting is effected by accumulation on capacitor C_1 of charges Q produced by each random event, (e.g., emission of an electrically charged particle). This causes the voltage on the capacitor to increase. At the same time the current is fed at a steady rate into another capacitor C_2. Both capacitors start to charge when switch S is open, and the test is terminated when either has acquired a pre-set charge. Thus all tests producing "below tolerance" decision require the maximum time allowed by the time limit of the C_2 setting.

New Method

The faster method discussed in the paper (Fig. 2) has a steady current I flowing out of the counting capacitor at the same time as the charges Q flow in. The current has a value which would just balance the charge entering the capacitor if the pulse rate were exactly at the tolerance level. Thus the capacitor integrates the difference between actual pulse rate and tolerance pulse rate. When the voltage across the capacitor rises to a pre-set value, a dangerous situation is indicated; when it falls below a given value a satisfactory condition is expected.

The paper is concerned with discussing the statistical theory behind the two techniques and quotes results showing substantial time savings by the second method, especially when most tests give a "satisfactory" result.

One disadvantage of the technique represented by Fig. 2 is that it may require an excessively-long test before a decision is reached with radioactivity close to the tolerance level. This defect can be overcome by applying a time limit to the duration of the test, and relatively simple techniques are available for doing this.

NOTES ON WIRING

BY MEGOHM

I READ the other evening about a proposed drive by manufacturers to cut out the "drudgery" in the home. This, according to my paper, is being tackled now at the drawing board stage, and by early next year the fight will be in full swing. All the giants in the field of manufacture are apparently lining up to invade the homes of Britain and install washing machines, spin dryers, garbage destructors, etc. etc. We are told that only 44% of our homes have washing machines, less than 31% have refrigerators and a tiny 8% have spin dryers. If the prices of these goods are attractive enough, then the scope looks really good.

Nobody, least of all myself, will be against this drive to make life easier. The only thing which worries me is whether the houses of Britain are adequately wired to receive these machines, which all require a point to operate them from and the correct voltage to make them run efficiently. Yes, it is an old subject, I know, but still a very serious problem to many of us. In many homes even now the purchase of a washing machine means some sort of bodged-up electrical outlet to serve it. Many new houses now being built will not help the situation, for these, in the main, are inadequately wired. It should be noted that this drive is wholly concentrated on the electrical industry, and if it succeeds then I can see the supply side of the industry meeting problems as well.

The drive is also going to concentrate on the lady of the house; if it impresses and convinces her then it no doubt will succeed. We engineers should make a sustained effort to convince the ladies that something should be done about providing an adequate number of sockets in the home. I hate to say it, but they seem to be "in charge!"

Fuses

My remarks concerning attempts to purchase a 30 A cartridge fuse prompted another question from a colleague. I was asked how many 13 A plugs in the country were correctly fused for the apparatus they were serving. A good question, don't you think? And a very difficult matter to check and rectify, if that becomes necessary. With the problem in mind I asked two neighbours if they would allow me to check their plugs as a matter of interest. Both agreed, and the results were as I expected. Neither had any real electrical knowledge and, therefore, relied on advice from the people they bought electrical goods from or their local electricity showrooms. One of the people concerned worked in London and had on occasions bought plugs in shops near his place of business and these plugs had 13 A fuses in them although their intended use had been explained to the supplier. One such plug served a wrought-iron table lamp by means of a twin-core flexible lead. To add to the danger, the flexible was knotted around one leg of the lamp so that the flexible hung "out of the way." Another plug, purchased for use on a kettle, had been supplied with a 2 A fuse and the correct fuse had been inserted only after the kettle had been taken in for repair because it blew three similar-sized fuses.

My other friend was not quite so badly off, because he had a cutting from a monthly magazine which showed a fair guide to the size of fuses which should be used on various pieces of electrical apparatus. Only one fuse was incorrect and that was in a spur-box serving a 500 W fixed heater in the bathroom. The fuse in the spur-box was of 13 A size.

Such problems are not easily solved, and even the attempts by apparatus manufacturers who state which size of fuse should be used with their goods very often fall on stony ground. Incorrect fusing can be a real source of danger and not easily detected until the damage is done.

Third Pin or Not?

A business friend of mine who knows little or nothing of electrical matters mentioned to me that the area in which he lives has just been declared a "smokeless zone" and that he had gone completely electrical for heating. In view of this, he had had "these 13 A things" installed and then proceeded to ask me the reason for the third pin on the plug. I carefully explained the reason for the third pin and how it was a safeguard for him when he used apparatus constructed of metal. He seemed satisfied, but then he turned to me and asked why the person who had been responsible for the connecting up at the meter position had suggested that a "two-wire system" would have been just as good.

As in so many instances of this nature, the exact identity of the person who made the remark was far from clear, and his reasons for the preference of two-pin sockets and plugs even less clear. Obviously, he expected his statement to be taken without argument.

I suppose there are a number of electrical engineers who consider a non-earthed system safer than one which earths all exposed metal, but I don't agree with them. There has been too much trouble with shocks when equipment supplied from sockets in "earth-free" positions has been used in "earth-fraught" areas.

Statements like those I quote leave doubts in the minds of such people as my friend for, as I see it, he consulted a contractor who advised a ring circuit, and when some alteration to the supply arrangement was necessary someone else contradicted the advice of the contractor. A sad mix-up indeed, and one which could be caused by one of many reasons, including prejudice, lack of real knowledge and false sense of authority.

I use the last description having in mind the meter-reader who once called (when I was out, needless to say!) and proceeded to look at all the switches, etc., and offered suggestions about a better type to have installed. I suppose he was slightly misled by the variety of different makes of switches fitted to my installation! But how else can one really comment on sample switches than to fit them and use them?

I know that many arguments and discussions could be based on the pros and cons of the earthed and non-earthed system. No doubt I shall hear some of them, and be involved in them, but I still think that the former is the safest. However, as in the case of the fuses, the ordinary person must be educated in the matter and this immediately raises the question of just how much should he, or she, be told.

A.C. systems for road vehicles

FIRST ALTERNATOR/RECTIFIER SETS FOR CARS

ONE of the features of the Motor Show, reported last week, was the first alternator/rectifier equipment for road vehicles. At the Commercial Motor Show, held a few weeks earlier, complementary equipment for the heavier vehicles, using 24 V systems, was exhibited by CAV Ltd. Both companies have adopted wound rotor fields with three-phase stator windings in their designs but CAV have also tried out permanent magnet rotors in similar equipment for railway use. The Lucas alternator incorporates an eight-pole two-piece rotor; the CAV rotor is 12-pole formed by two interleaved cup-shaped six-fingered components.

The Lucas System

Taking, first, the Lucas Model 2AC, this is a compact air-cooled unit with inbuilt silicon diode rectifiers only 6¼ in. in diameter and 7½ in. in length, including shaft, and weighs 17¾ lb without the pulley. The nominal d.c. output is 45 A at 12 V, this figure being attained at an alternator shaft speed of 2,000 r.p.m. At 1,000 r.p.m. the output is 10 A and at 5,000 it is 55 A hot, 60 A cold.

The stator comprises a 36-slot, three-phase, delta-connected winding on a laminated, ring-shaped pack held between two cast aluminium end brackets. The six silicon diodes are enclosed in the bracket farther from the fan and are air cooled, supplemented by the heat sink effect of the bracket and cooling copper strips fitted between and beneath the diodes. Supply to the field is through two cupro-nickel slip-rings and, of course, the direction of rotation is immaterial. The maximum speed of rotation, set by the bursting effects on the rotor winding, is 11,000 r.p.m.

Voltage regulation in the Model 2TR control box is by a vibrating contact-type regulator shunted by a transistor which serves the dual purpose of reducing the current broken by the contacts and as a current amplifier enabling higher values of field current to be employed. A field discharge diode protects the transistor from the inductive voltage surges inherent in the field system. No cut-out is required since the rectifiers themselves prevent reverse flow, but a separate relay, Model 6RA, is required to isolate the alternator field and regulator windings when the ignition is switched off. Alternatively, a ganged double-pole ignition switch may be used.

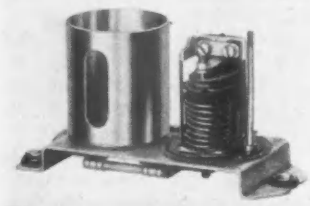
The Circuit

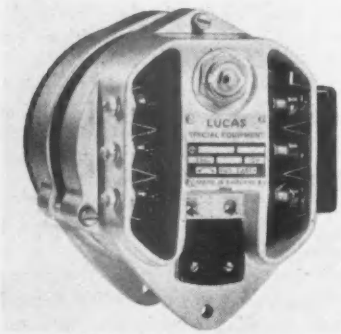
On switching on the ignition circuit, the relay or second pair of contacts applies positive flow from the battery to the emitter, E, of the transistor and through the base resistor, contacts and frame to the negative battery terminal. Transistor action then permits the flow of current through collector, C, and the frequency coil to the rotor slip-rings. With the motor running and the alternator output rising, the pull of the regulator winding increases until the contacts are separated, interrupting the base circuit current and, consequently, the field current as well. The fall in alternator voltage recloses the contacts and the cycle is repeated many times/sec, the ratio between open and close intervals regulating the output voltage to fine limits. The circuit is shown for present-day positive earth systems and a modification is necessary for negative earth.

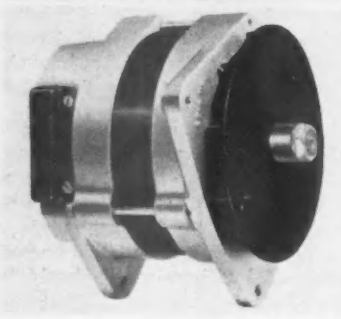
The CAV System

In the CAV system, the alternator and rectifier are separate units. The rectifier, Type RUS-6, is a dry-plate selenium type with natural cooling for ambients up to 35°C. Above this, forced cooling is recommended.

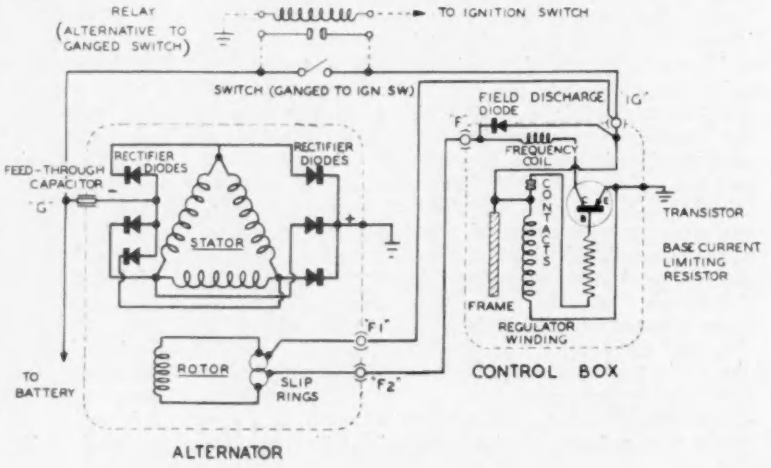
At the moment, alternative types of control board are available. Type 189-59 is a conventional vibratory contact regulator; Type 367-2 employs transistors. An isolating relay is also enclosed within the control unit which serves to disconnect the alternator field from the battery when at rest.







Left, Lucas Model 2AC alternator with end view, showing the silicon diodes in position, and the 2TR control box. Below is the circuit diagram for a positive-earth vehicle system



Bradwell prepares for nuclear fuel

CHARGING MACHINE COMPLETE

FIRST of the two massive 400-ton machines which will charge and discharge nuclear fuel in the first reactor at Bradwell 300 MW station is now ready for use and we were recently able to see it in action. The machine operates in the 70 ft high charging room above the reactor pile cap. When handling nuclear fuel elements, all its operations will be controlled remotely from an adjacent radiation-screened control room.

Externally, the station has assumed a more finished appearance with a cladding of aluminium and glass concealing most of the reactor shields, heat exchangers and ancillary equipment. Laying of number one reactor core graphite is complete and the principal remaining work inside the reactor vessel is in connection with burst-slug detection equipment. Core laying in the second reactor will soon begin. All six gas circulators for the first reactor and their associated variable speeds turbo-alternators which give gas flow control, are virtually complete and have undergone preliminary tests. The three 52 MW turbo-alternators for number one reactor are also nearing completion, while work on the remaining three sets for the second reactor is well advanced.

The main control room where electrical, boiler and reactor controls are centralised, is in use for regulating incoming supplies from the grid for works auxiliaries. Control panels for the station auxiliaries are in use and most of the reactor and electrical instrumentation is in position and awaiting tests.

The first consignments of fuel are now arriving by road, and loading of the reactor is scheduled to begin in mid-March, 1961. During the three or four months that the reactor will take to work up from criticality to full load, fuelling will begin in the second reactor.

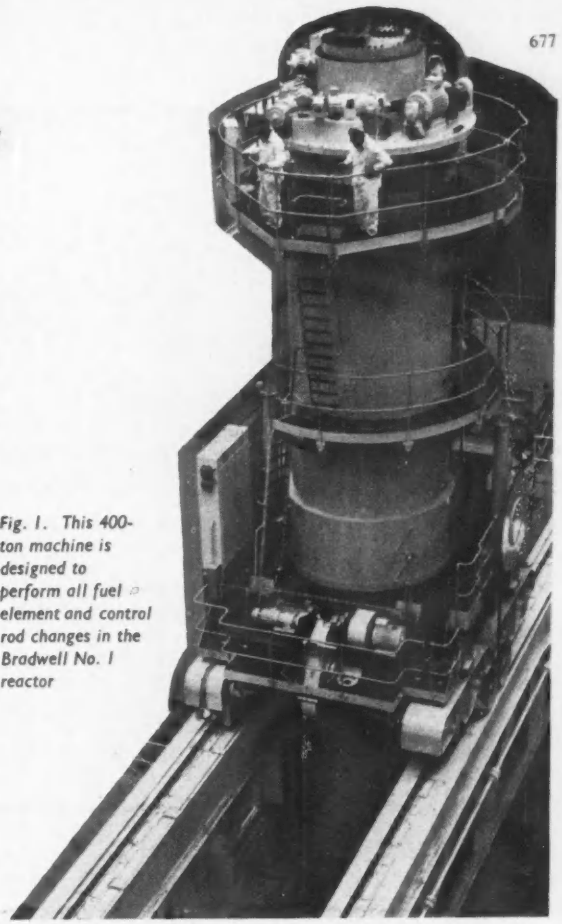


Fig. 1. This 400-ton machine is designed to perform all fuel element and control rod changes in the Bradwell No. 1 reactor

Fuel Handling Machine

All fuel and control rod changes in the reactor will be performed by a single machine, with a second machine provided for stand-by use. Each machine is 52 ft high and traverses a gantry approximately 100 ft wide. The machines were designed and built by Strachan and Henshaw, who are also building similar machines for Dungeness and the Italian station at Latina.

Both the traverse movement of the machine and longitudinal movement of the gantry have a fast travel of 20 ft/min, while final positioning over a particular standpipe is at $\frac{1}{4}$ ft/min with precision assured by optical devices. Each fuel channel in the reactor core houses eight elements and access to a group of 34 channels is obtained from a single standpipe by a charging chute lowered from the machine. Before the charging chute is positioned, the machine must raise and store the standpipe radiation plug and a gas seal must be established. After the charging chute is lowered into the reactor vessel, irradiated fuel may be drawn up element-by-element until a maximum of three channels have been emptied. These elements are stored in the machine, which also has capacity for the equivalent number of unused fuel elements. The machine also houses two grabs driven by variable speed motors for fuel and control rod handling.

The electrical drives for the machine have been kept as simple as possible. High-speed traverse of the machine on the gantry is by a single 10 h.p. induction motor, while a 1 h.p. induction motor provides the creep speed. The gantry is driven by one 10 h.p. and one 1 h.p. induction motor at each end for the high speed and creep, respectively, and the motors are linked by a fly shaft. The drive pulls the gantry along chains laid in the pile cap floor adjacent to the running rails. The two hoists are powered by a.c. variable-speed 4/1 h.p. motors.

The combination of machine and gantry drives enables an operator on a platform at the base of the machine to position it over a particular standpipe, or above fuel storage, maintenance and loading or unloading holes. Once the machine is positioned, all further operations are controlled remotely. All motions of the machine are displayed on panels in the control room, which also includes television equipment to enable parts in transfer between the machine and reactor to be viewed without hazard.

The machine is designed to change the fuel in three channels in 24 hours. The core contains 2,575 channels, and to achieve the continuous loading programme for which the station was designed, fuel changing will commence soon after the reactor comes into service.

Nuclear fuel arrives at Bradwell by road. Each reactor has a room where it is stored in boxes until required. Elements taken from the store are first inspected and then loaded into a magazine. This magazine has a rotating

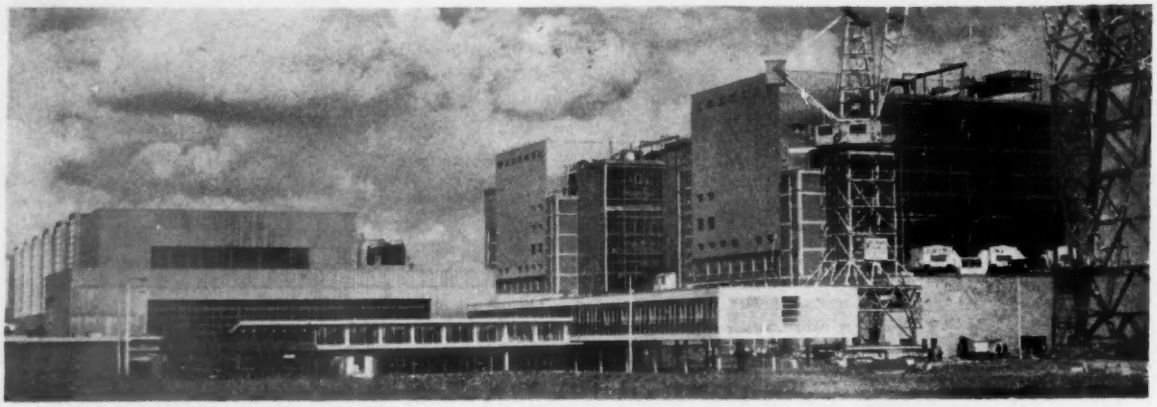


Fig. 2. Bradwell's reactors and heat exchangers are now concealed by nearly completed glass and aluminium cladding. On the left is the turbine hall and administration block

turret with capacity for three fuel channels. A loading tube connects the magazine with the pile cap level where the charging machine operates.

When the machine has changed the elements in a group of channels, it moves to the unloading hole. Here the irradiated elements are lowered on to a skip which runs on an underwater carriage. When all the elements have been unloaded the skip is drawn along an underwater duct into the decay pond.

The irradiated fuel elements remain in the decay pond for a period before they are taken by a crane to the coffin bay. The elements are loaded into empty coffins under water and a transporter takes them to the separation plant.

Bradwell nuclear station is being constructed by the Nuclear Power Group—a partnership of the AEI-John Thompson Nuclear Energy Co. and the Nuclear Power Plant Co.

European Equipment Approval

ADOPTION of green/yellow for earth cores of portable appliances was the outstanding decision of CEE* at its autumn meeting in London recently. Although this captured popular headlines, there were many other decisions taken of importance to the free flow of trade in electrical equipment. For example, a proposal was made that a colour code be introduced for identification of conductors in fixed wiring as distinct from flexibles. The UK delegation opposed this, as did representatives of some other countries, on the grounds that it was better to leave such matters to those responsible for wiring regulations in individual countries. However, the counter-argument was advanced that such a code could be applicable to equipment such as machine tools, in which there was international trade. The matter was remitted to a technical committee dealing with cables.

CEE is, of course, only one of the international bodies operating in the electrical standardisation field, and some of the time at the meeting was given to discussion on IEC standards. One of those affected was that dealing with mains-operated radios. IEC are to be asked to include a standard CEE classification for protection against electric shock. In this, Class 1 represents equipment protected by earthing; Class 2 that protected by suitable insulation; and Class 3, equipment operated at extra-low voltage.

Rules of procedure for CEE were discussed at the London meeting and an important British proposal was accepted. This provides for incorporation of provisions that if any member body of CEE finds it is unable to accept a CEE specification as a national standard, because of difficulties about dimensions, a note to this effect shall be included in the relevant CEE publication.

* CEE is the International Commission on Rules for the Approval of Electrical Equipment. It endeavours to bring into line safety regulations of individual countries for a wide range of electrical equipment.

Technical Committees

Besides plenary meetings, opportunity was taken of the London gathering for meetings of a number of technical committees. Socket-outlets received consideration, and there was provisional agreement on a number of details of types and tests. There was agreement that a new draft for switches for appliances should be circulated for consideration at another meeting to be held next spring.

Draft recommendations for creep distances and clearances came under consideration, with the rejection of a secretariat proposal that test voltage should be used as a basis for classification. It was decided that there should be three classes for creep distance and clearance according to whether pollution was negligible, normal or heavy. A table of provisional values within these classifications and for various voltage ranges was agreed.

Lighting fittings have been under consideration by CEE for some while, and further progress towards agreement was made in consideration of a fifth draft of a standard. Detailed British proposals for a test method for heating were agreed, as were the general lines of a test for dust-tight enclosures on the lines of an existing German test.

A meeting of the cable committee considered proposals of a working party on standardisation of conductors of non-flexible cables. Although these were agreed on the whole, Britain, unlike other countries, said the changes involved were so great that it was not possible to say whether or when the proposed CEE standard could be incorporated in British standards for cables.

D.C. for industry

E.D.A. INDUSTRIAL DEVELOPMENT CONFERENCE

THE principal subject for discussion during the Fourth Industrial Development Conference, organised by the Electrical Development Association at Leamington Spa last week, was the provision of industry's d.c. requirements from an a.c. generation and distribution system. Mr A. N. Irens, M.SC.(ENG.), M.I.E.E., Chairman of the South Western Electricity Board and also of the EDA Industrial Development Committee, presided.

D.C. to A.C. Conversion

In the opening paper, Mr J. E. Boul, A.C.G.I., M.I.E.E., of the English Electric Co., made the point that there are many cases where d.c. supplies were essential to industrial processes. In other spheres the use of d.c. holds attractions by way of providing an operating convenience which cannot be equalled by a.c. though there are categories in which the rival merits of a.c. and d.c. are subject to debate, personal preference and even, on occasions, to prejudice.

Taking, first, the electric motor. The outstanding characteristic of the d.c. motor is its high starting torque coupled with ease of speed regulation. The speed range of 2 or 3 to 1 is readily obtainable by field control and, by varying the applied voltage, maximum torque can be maintained over the whole range. Moreover, the regulation is smooth and, since small control currents in field systems are concerned, the design of the system is simple and reliable. Braking by regeneration and reversing can also be effected by regulation of the small field currents and the control equipment is silent in operation.

By contrast, a.c. motor control gear, inserted in the main current conductors, is heavier in construction, inclined to be noisy and may be subject to pivot and bearing wear through vibration. For the single speed drive and where starting torques are not greater than 2 to 3 times full load torque, the a.c. motor is, of course, unrivalled.

Electro-chemical Processes

Electro-chemical processes almost invariably need d.c. at high currents and demands. The products range from metals and chemical compounds to gases.

In the production of aluminium from alumina dissolved in cryolite at temperatures above the melting point of the metal, the process takes place in electrolytic baths in which the current flowing ranges from 40,000 to 100,000 amps or more at 5 V; it is usual to connect a number of such cells in series so as to utilise a higher overall voltage of anything from 500 to 1,000. Typical lines range in size from 25 to 100 MW with an annual output of 10,000 to 40,000 tons. In such processes a desirable economic aim is 24 hrs a day 365 days a year and such an aim places a high premium on continuity of supply and plant reliability. Should supply cease for more than an hour or so, the "melt" will solidify, necessitating many weeks of work in rebuilding the cells.

Processes involving aqueous electrolytes are limited by official recommendations to 250 V in order to prevent leakage currents to earth across the cell insulation. Other

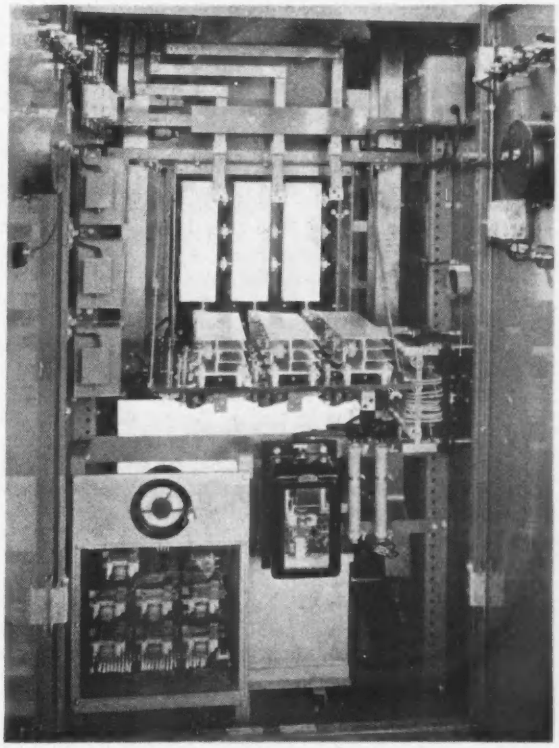


Fig. 1. A 100 kW 60/67 V, 1,500 A silicon rectifier unit for electrolytic duty. The cubicle doors are shown open with the rectifier tray lowered for inspection (GEC)

electrolytic processes include chlorine generation, used as a bleach and also in considerable quantities by the plastics industry, hydrogen, hydrogen peroxide, ammonia, nitric acid, fertilisers, ethylene dichloride, sodium chlorate and caustic potash. An Indian unit for the production of fertiliser was quoted as having a total demand of 176 MW, using mercury arc rectifiers, and with an output of 1,200 tons of fertiliser a day.

Electro-plating, anodising, electro-chemical milling, grinding, deburring, polishing and the forming of battery plates are all indicative of industrial processes requiring substantial, though lower, d.c. power.

Motor Drives

For certain industrial processes d.c. drives are essential. These include rolling mills, paper mills, rubber calenders, mine winders and some cranes. Consider the requirements of a steel rolling mill incorporating a number of separate motor drives. The first process is "cogging," the passing of an ingot to and fro through a succession of reversing rollers at varying speeds. Each pass results in a reduction in cross section of the ingot and an increase in length until the former has been rolled down to the required shape

and size. The requirements for the drive are high torque at low speed, low torque at high speed, frequent reversal of rotation and rapid acceleration and retarding in either direction to reduce unproductive time.

Though these requirements may be met by a.c. induction motors in the smaller mills, the d.c. motor shows a considerable saving in energy. On the larger units, it may need d.c. motors ranging from 10,000 to 25,000 h.p. running at speeds not more than 100-120 r.p.m. The time for reversing such a mill may be of the order of one second.

In tinplate rolling, the ingot is reduced to thin sheet or strip in a series of "passes," the first of which are carried out hot and the last, when the strip is sufficiently thin, cold. As the strip lengthens, for convenience and economy it is threaded through a succession of rollers, or "stands," in tandem each increasing in speed to prevent the strip buckling or looping between stands. This necessitates close control of each of the roll motor speeds, which may have to be within $\pm\frac{1}{4}\%$ of the set speed. Except for the initial roughing stands where the speed requirements are not so stringent, this can only be done with d.c. motors. A typical mill may comprise ten stands, of which the first three are driven by a.c. motors and the remainder by d.c. motors.

In cold strip rolling the tension between stands to stretch the strip is achieved by increasing the speeds of successive motors, again to closely controlled limits. In the last stand it may be passing the strip at as fast as a mile a minute while a much lower speed, say 200-300 ft/min, has to be adopted for threading. Acceleration from the threading to full rolling speed must also be carefully controlled. The required operating speed range of 25: 1, high accuracy of speed and load control, rapid response and capability of changing smoothly from motoring to generating (for braking) at a given speed are ideally provided by the d.c. motor.

Inevitably a twilight zone will exist where the technical needs of a drive are not so exacting as to demand d.c. control, and the preferred practice will change, as developments take place which affect the performance, in favour of one or the other.

Railway Traction

Another sphere is that of railway traction, in which the battle of systems has raged for many years and continues to be fought with heat in many circles. There are two problems; that of driving the train and that of supplying the current to the train whilst in motion. The former favours the d.c. series compound motor; the latter favours a.c. transmission enabling higher voltages to be employed on the conductor lines and rails, with preference for the lower cost overhead system.

In the early years of electric traction low frequency a.c. at $16\frac{2}{3}$ c/s were tried, the reduced frequency overcoming. to some extent, the poorer inherent starting torque of the a.c. motor. As the idea of a standard system frequency took hold, with a balance in favour of 50 c/s, the a.c. traction system gave place to d.c. with third rail conductors. Though a satisfactory 50 c/s a.c. traction motor is still beyond attainment, recent developments in static a.c./d.c. conversion have enabled railway systems to use relatively high a.c. for transmission with rectifiers on the train to provide the d.c. for the traction motors. Such systems have been used in several countries, notably Britain, France, India and Russia.

Marine Propulsion

In marine propulsion, requirements differ from those of rail traction. Nevertheless, for tugs and ferries, where the emphasis lies on manoeuvrability and easy control, d.c. propulsion is usually preferable. For the ocean going liner a.c. induction or synchronous motors are at home in providing the link between the steam turbines and the screw propellors.

There is, of course, no alternative to d.c. for the excitation of generators and alternators, for lifting magnets, electrostatic dust precipitators and a variety of electronic devices as well as a host of applications which depend upon a battery for their supply in an emergency. D.C. transmission is also a field of some promise in that line losses at exceptionally high voltages over long distances are reduced, but the limitations here lie mainly in the forms of circuit-breaker suitable for controlling fault currents and the initial provision of line reactive load. But these problems may be solved in time. Meanwhile some d.c. lines have been and are being erected in Sweden (70 MW), France/Britain cross-channel (160 MW) and Kashira-Moscow, while an 800 kV 700 MW d.c. line is being experimentally developed between Dombas and Moscow to transmit power from Siberia to Western Russia.

D.C./A.C. Converters

Of the many methods of converting a.c. to d.c. most are so well known as to need no description. These include the oxide and polycrystalline (selenium) rectifiers, synchronous commutating devices and vibrating "reed" rectifiers, rotary converters and motor converters. In recent years emphasis has shifted to the use of static rectifiers, including mercury-arc, monocrystalline semi-conductor and thermionic types. Though the Ward-Leonard and Ilgner sets are still favoured for many fields, there is indication that the former may be largely supplanted by grid controlled mercury-arc rectifiers in the future.

Rectifiers

Rectifiers can be grouped into three broad classes: thermionic, mercury-arc and crystalline. The former, the conventional "valve" of radio and allied techniques, used as a rectifier, with or without grid control, provides d.c. at high voltages but relatively low current. Mercury-arc rectifiers can be divided into glass envelope and steel tank types with the latter again sub-divided into pumped and pumpless. In all three the principle is the same: a mercury pool cathode in an exhausted enclosure with one or more

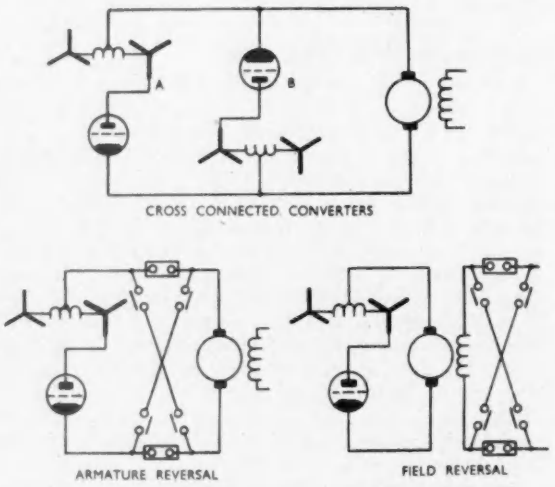
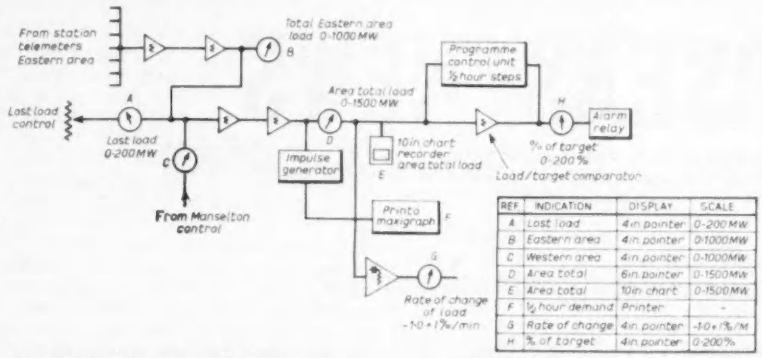


Fig. 2. A schematic presentation of the different methods of achieving motor reversal with mercury-arc rectifiers



REF.	INDICATION	DISPLAY	SCALE
A	Lost load	4in pointer	0-200 MW
B	Eastern area	4in pointer	0-1000 MW
C	Western area	4in pointer	0-1000 MW
D	Area total	6in pointer	0-1500 MW
E	Area total	10in chart	0-1500 MW
F	½ hour demand	Printer	-
G	Rate of change	4in pointer	-10+1%/M
H	% of target	4in pointer	0-200%

Fig. 3. Schematic diagram of the telemetering system as adopted by the South Wales Electricity Board at Church Village, Pontypridd

anodes and an igniting device. Single-anode devices may be classified as excitrons or ignitrons according to the principle of excitation incorporated. The ignitron depends for the formation of a hot spot on the surface of the mercury by a current pulse applied to a permanently immersed igniter, the tip of which just breaks into the surface of the mercury. The excitron uses an excitation anode suspended above the mercury, which maintains a permanent arc from a subsidiary source. Both ignitrons and excitrons may incorporate grid control. Multi-anode rectifiers also may incorporate grid control and are used in conjunction with multi-phase a.c. supplies. For industrial use the metal tank rectifier is preferred and, in most cases, it is of the pumpless, air-cooled type.

Semiconductor rectifiers in the crystalline group, mainly silicon and germanium, are monocrystalline and are replacing the copper oxide and polycrystalline selenium types for most industrial purposes. Of the two semiconductors, silicon is the more suitable for higher temperatures than germanium, but the forward voltage drop of 1·2 volts is about double that of germanium. In the diode form, both types have established themselves for industrial power uses which do not require continuous voltage control, particularly in the very heavy current electrochemical industries, where they are on the way to superseding the mercury-arc rectifiers.

Grid-controlled mercury-arc rectifiers have supplanted Ward-Leonard drives for motor control in some cases, the regulation being applied as a bias to the grid. It is not, however, possible to obtain reverse rotation of the motor by phasing the rectifier grids back to the condition for inversion and other methods have to be adopted. Three ways of meeting the problem are shown in Fig. 1.

D.C. Loads and the Supply Boards

For industrial purposes, rectifiers are all of the multi-phase type unless the load is low and the ripple content unimportant. The effects of large d.c. rectifier loads on the supply system were dealt with in a paper presented by Dr W. G. Thompson, PH.D., B.SC., M.I.E.E., of the General Electric Co.

Dealing with the effects of harmonics associated with rectifier equipments, he showed that the harmonic content impressed on the a.c. system is inversely related to the pulse number. Single-phase a.c. traction will bring in all orders of harmonics, but on multi-phase systems, as the pulse number is raised the harmonic content is progressively lessened. To protect against loss of rectifying action or backfire on mercury-arc rectifiers, instantaneous tripping of the a.c. breaker, together with operation of reverse current high-speed d.c. breakers, is essential. High-speed fuses in the secondary connections from the transformer is another arrangement particularly applicable to the glass envelope types.

Load Control

The control of industrial loads, both d.c. and a.c., was the subject of a paper presented by H. Jackson, B.SC., M.I.E.E., and R. F. Charles, A.M.I.E.E., both of the South Wales Electricity Board. Though the statutory obligations to maintain supply and voltage within prescribed limits laid down by earlier Electric Lighting Acts were, perforce, suspended in the immediate post-war period when plant was inadequate to meet the demand, this phase is now happily over. Load shedding, except in an extreme emergency, is a thing of the past.

The cost of electricity to the consumer is, however, governed largely by the load factor and voluntary restriction of demand at peak periods by large consumers can be a valuable contribution to lower overall current costs; indeed, a new feature of the bulk supply tariff introduced on 1 April, 1960, provides special terms to those who can offer disconnectable loads of not less than 25 MW to the Board.

Such consumers are, of course, comparatively rare, but in the Pontypridd area of the South Wales Electricity Board the conditions are particularly suitable for central control of load. Describing the new central control system which has been installed at Church Village, the authors pointed out that the prime purpose of erecting the centre was for maintaining continuity of supply but, paradoxically, it has provided a means by which load control can be effected on an area board scale.

Outlining the methods by which the system was operated, it was stated that, during the winter of 1959-60, it was possible to reduce Area Board demand by 60 MW. Much of the disconnected peak loads is recoverable, in terms of industrial production, by planned diversity. In this way a large manufacturer of chemicals, using 3-18 MW submerged arc calcium carbide furnaces, was able to reduce his load from 54 MW to 38 MW for a number of weeks or to 2 MW for short periods, on receipt of instructions from the central control engineer, without serious loss of production. Revised working schedules, ensuring that all heavily loaded plant is not in operation at the same time or is only together at off-peak periods, and the development of off-peak loads is another way of attacking the problem.

Telemetering equipment is a vital contribution to central control and, with a knowledge of the local peaking periods and their significance in terms of individual large consumers, the Area Board control engineers can make a valuable contribution to overall load factors. Initially confined to large consumers, there is no reason why smaller consumers should not be drawn as time passes. Ultimately, central control can be further approached on a national basis by the CEGB.

Other papers read before the conference included an interesting dissertation on the principles of heat transfer and the approach to the industrial heating problem by J. T. Sharples, of the EDA; characteristics and applications of the silicon-controlled rectifier by A. H. B. Walker, of Westinghouse Brake and Signal Co.; and the applications of metal-sheathed, mineral-insulated heating elements in industry by N. Kershaw, of the NWEB.

OVERSEAS NEWS

from our correspondents abroad

CANADA

Quebec Hydro Gains

Although new rates reduced the revenue per kWh of domestic consumption from 1·28 cents to 1·25 cents, a substantial increase in both revenue and sales is disclosed in the recently published annual report of the Quebec Hydro-electric Commission for the year ending 31 Dec., 1959. Over the year, assets rose by 14% to $1,062,496,769 but the operating costs rose by only about 1% over the previous year to $40·1 million. The amount available for transfer to reserves was also slightly higher than the previous year at $24·7 million after taking into consideration $22·84 million paid as interest on the funded debt.

A rise of 10% in the total electricity sales from 12,400 million kWh to 13,600 million kWh during 1959 included nearly 1,900 million kWh of domestic sales. Domestic sales are now averaging 4,086 kWh per consumer, an increase of nearly 9% on last year. This rise is attributed to a new sliding scale rate of charges.

Priority Power Study

No doubt the recent report published by a delegation of Canadian engineers who visited the USSR has had some influence in prompting the Government to propose a rush, full-scale economic study of Canadian electrical needs for the next 20 to 40 years. The National Resources Minister, Mr Alvin Hamilton, is reported to be bringing together representatives of provincial Governments, power utilities and electrical manufacturers to discuss future developments. He said the Government was giving top priority to greater Canadian electrical power development. A full-scale economic study to assess future power needs and examine power systems growth and power resources would be followed by a physical study of methods of transmission and generation. Political questions to be settled were how such a power grid could be financed and under whose authority it would operate. It seems that a number of Canadian power leaders are not pleased with the Government's proposals. They think that Canada should be moving much faster in power development.

It is clear that the delegation to the USSR was much impressed by developments there and some of their findings were reported in the ELECTRICAL TIMES for 6 Oct. Leader of the delegation Mr J. S. Duncan, chairman of Ontario Hydro, said that negotiations are under way to send groups of Canadian utilities men to the USSR to obtain more specific information, and the way has been paved for an exchange of specialists between the two countries. Electric power production in the USSR is now double that of Canada and by 1975 the Russians may be producing more power than the US.

AUSTRALIA

330 kV switchgear contract

A contract for ten air-blast circuit-breakers rated 2·4 kA, 330 kV, 15,000 MVA has been awarded to A. Reyrolle by the NSW Electricity Commission. The circuit-breakers will be installed at the Sydney North substation where two 380 kV transmission lines will terminate from the 1,500 MW Vales Point station, now under construction. Reyrolle have also recently received contracts for 132 kV small-oil-volume circuit-breakers and 3·3 kV air-break auxiliary switchgear for Vales Point and also 330 kV transmission line protection on the NSW-Snowy Mountains system's interconnectors. The substation is about 25 miles from the centre of Sydney and 80 miles from Vales Point.

Hydro-electric Supplies Assured

Water levels in the Tasmanian Hydro-electric Commission's Central Highlands storage lakes were recently described by Mr A. W. Knight, the Commissioner, as eminently satisfactory. Following heavy rains earlier this year, levels in Great Lake and Lake Echo are only about 1 ft below normal. This capacity could keep the Commission's turbines generating for a dry spell lasting a year if necessary, and extra industrial demands could also be met if they arose. While the reservoirs were filling during the earlier parts of this year, the effects of flooding in the lower reaches of the catchment area were reduced, but Mr Knight pointed out that, with the storage lakes nearly full, most of the water brought down by prolonged heavy rains in the future would not be retained behind the dams.

Nuclear Contracts Sought

Possibilities of extending uranium contracts with the UK and US and arranging new ones would be investigated by a mission leaving Australia early next year. This was announced by the Premier of S. Australia, Sir Thomas Playford, during a recent broadcast. The mission would be led by Mr P. A. Barnes, the S. Australian Director of Mines, and Mr C. R. S. Colyer, general manager of the Electricity Trust. Mr Barnes would examine the possibilities of further uranium contracts as existing contracts are due to expire in 18 months. It is Mr Colyer's intention to examine progress made with nuclear power stations overseas.

The Premier also commented on a serious labour shortage in S. Australia. Many professions are seeking overseas immigrants and the Electricity Trust was also said to be desperately short of skilled staff.

CHILE

Loan for US Equipment

Authorisation of a $42 million credit to the Chilena de Electricidad Ltd. (Chilena), Santiago, has recently been granted by the export-import bank of Washington. The loan will cover an expansion and modernisation programme to be spread over a five-year period at a cost of nearly $93 million. This plan includes provision to increase generating capacity by 200 MW, initially by acquiring two 50 MW turbo-generators, four boilers and four surface condensers from the USA. The loan also covers equipment for transmission lines, substations and distribution facilities and is to be repaid over a period of 20 years.

Chilena, which now operates eight generating stations, is a subsidiary of the American and Foreign Power Co., of New York, and has operated in Central Chile for nearly 40 years. The loan makes possible replacement of present operating equipment, and new plant to meet the steadily rising power demand.

KOREA

Power Plans

In plans for further power development in Korea, it is expected that world tenders will shortly be called for equipment for the proposed Kunsan 30 MW steam power station. The engineering survey for this project was carried out by American consultants Burns and Roe, and a sum of $9¼ million has already been allocated from American ICA funds for its construction. Korea,

of course, is seriously short of electric power supplies and a number of schemes have been prepared to alleviate the trouble. One project intended to help the south west is a 20 MW gas turbine plant at Sonjong-ni, near Naju, in Cholla Nando Province, for which tenders were recently received. There is also a 100 MW steam plant project for Kamchon, near Pusan, and there are plans for various other thermal and hydro schemes. Lack of foreign exchange, of course, is the principal obstacle to the initiation of the schemes. Until this year, the programme was based entirely on foreign aid, and it is evident that the country will eventually need long-term credit. Total installed generating capacity in Korea is about 372 MW, of which 143 MW is hydro-electric. Peak output last year was 282·4 MW, and it is estimated that demand will rise to 570 MW in 1962, 753 MW in 1965, and 795 MW in 1969.

UGANDA

Modernised Cooking

The traditional native dish, "Matoke," can now be produced in modern style by an electric steamer devised by the Uganda Electricity Board. The two-part steamer has an element in the lower half designed for operation with the compact 5 A consumer's units which were recently introduced by the Board. The steamer has been introduced under the Board's campaign for the widespread electrification of small homesteads, and sales are being undertaken directly by the Board. Use of the steamer, which has a capacity of 13 lb, is not expected to be restricted to districts where Matoke is eaten as it is equally suitable for use where maize constitutes the primary diet.

INDIA

Mysore Power Transmission . . .

During the Third Plan, power transmission schemes valued at Rs32 crores will be undertaken by the Mysore State Electricity Board. This was recently announced in the State Assembly by the Deputy Minister for Public Works, Mr Naghnoor. The plans include establishment of 36 substations in the State, which would cover most of the power needs in North Karnatak. In reply to further questions, the Deputy Minister said the 9 MW Tungabhadra left bank station will supply Raichur, Gulbarga and other districts, while power from the Sharavathi project would be available for all parts of the State through a high voltage network to be constructed under the Third Plan. Also under this Plan, estimated outlay on development of the Kolar Gold Field undertakings would be about Rs212 lakhs.

. . . and also in Madras

The third Five-Year Plan for power generation and transmission in Madras State was also discussed recently in the legislative assembly. The draft of the Plan also surveyed progress with the second Five-Year Plan.

Hydro Extensions

The third Five-Year Plan envisaged in Rajasthan provides for a considerable increase in power generation with the object of tapping the State's hydro resources to the maximum extent possible. The plan includes provision for a hydro project at Mahi to meet the needs of the Durgapur and Banswara districts, where important mineral deposits have been discovered. Power from the Chambal project will feed the Kotan, Ajmer, Bhilwara and Udaipur divisions. Bhakra will supply the Bikaner division. Two thermal projects are also proposed and it is intended to electrify all villages with a population of 5,000. The plan schemes will cost about Rs48 crores.

LIBERIA

Hydro-electric Proposal

Investigations into the possibility of hydro-electric supplies, although requiring further elucidation, are regarded optimistically by the Liberian Government. However, foreign investment would be required as backing for the projects. Growing power supplies seem likely to depend on increased domestic consumption for some time to come, unless local industry chooses to take its supply publicly rather than operate its own generating stations. A US export-import bank loan of $7 million has been granted to improve and extend the Monrovia power supply by 5·7 MW. It is reported that the present distribution system is in a very poor condition, except for the new British installed ring main and substations, despite the fact that power demand is increasing all the time. Supplies are at present obtained from the 6·8 MW Krutown station and two smaller stations with an aggregate capacity of 1·12 MW.

PAKISTAN

Revised Hydro Scheme

Complete revision of the Gomal Dam hydro-electric and irrigation project in the Dera Ismail Khan area is reported. The revised project which provides for 112 MW instead of 7·4 MW and irrigation of over 300,000 acres of land instead of 100,000 acres is being studied by WAPDA in consultation with Yugoslavian technicians. Cost of the project is estimated at Rs132 million and it would be completed in two phases. The first phase entails construction of a diversion weir at Murtaza with generators to provide 12·5 MW. This phase will assist in irrigation. The second phase envisages construction of a 400 ft high dam at Adamkok with hydro generators of 78 MW total capacity. Such a dam would regulate the Gomal, Zhob and the Wanatoi Rivers, which in the past have caused great flood damage in Dera Ismail Khan. Storage capacity of the lake behind the high dam would be 1·7 million acre ft and this would also ensure continuous supplies at Murtaza weir, enabling development of some 300,000 acres of agricultural land.

Kunhar Valley Hydro Project

An interim report on the feasibility of the WAPDA Kunhar Valley hydro-electric project has been prepared by a foreign firm of consultants and is reported to be favourable. In the first stage of the scheme, a 385 ft high dam with a storage capacity of 130,000 acre ft would be constructed at Suki Kinari. A pressure tunnel over five miles long would link the dam with the Potandes 95 MW power plant. The subsequent stage would consist of constructing a diversion dam at Paras and construction of a pressure tunnel. The Paras plant would have two 103 MW generators. In the third stage a 410 ft high dam would be constructed near the village of Naran, impounding 283,000 acre ft. In this stage, two additional units would be added to the Potandes power plant to build up a firm capacity of 207 MW. In the final stage a pressure tunnel would be constructed from the Naran dam to a further dam, upstream at Suki Kinari. This dam would have a capacity of 130,000 acre ft and a power plant of 95 MW. The project is estimated to cost Rs87,00,00,000 and would generate 500 MW. Altogether two storage dams and one diversion dam, three power plants and three power tunnels are involved with transmission facilities.

"Hot line" maintenance is soon to be used extensively by the Trinidad and Tobago Electricity Commission. The operators shown were attending a course on manipulation of the insulated rods used, held at the Central Training School, Arima, North Trinidad. It is hoped that the scheme will improve system reliability in the islands

Personalities *in the industry*

The Minister of Power has reappointed **Mr T. E. Daniel,** M.ENG., M.I.E.E., M.I.MECH.E., as chairman, and **Mr T. Coates,** M.ENG., M.I.E.E., M.I.MECH.E., as deputy chairman of the North Western Electricity Board. Mr Daniel's reappointment is for a period of three years, ending December, 1963, and that of Mr Coates for five years, ending December, 1965. The Minister has also reappointed **Mr G. A. Howe,** M.A., LL.B., A.C.A., as a part-time member of that Board. Mr Daniel became chairman of the North Western Board in 1955 after two years as deputy chairman of that Board. From 1948 to 1953 he was deputy chairman of the North Eastern Electricity Board and, prior to nationalisation of the industry, had been borough electrical engineer at Darlington for 11 years, during which period a new generating station was constructed there. Mr Coates first became deputy chairman of the North Western Board in January, 1956 (succeeding Mr Daniel in that position). Earlier, he had been sub-area liaison officer and manager of the Chester sub-area of the Merseyside and North Wales Board for seven years. Prior to vesting day he had been deputy city electrical engineer at Liverpool for three years.

Mr A. H. Olds has been appointed manager of the St. Ives branch of the South Western Electricity Board in succession to **Mr J. H. Jones,** who has been promoted to manager of the Board's Falmouth branch. Mr Olds joined the Board four years ago as a technical assistant in the Commercial Dept. at group headquarters, being concerned with rural development and tariffs, and was recently acting as group agricultural engineer for Cornwall. Mr Jones had been in charge of the St. Ives branch for ten years, prior to which he was manager of the Reading branch of the Southern Electricity Board.

The University Court of Edinburgh University has appointed to the newly established Chair of Electrical Engineering **Mr W. E. J. Farvis,** B.SC.(ENG.), M.I.E.E., F.R.S.E., senior lecturer in applied electricity and head of the post-graduate school of electronics and radio at the university. The appointment takes effect from 1 Jan., 1961. During his 12 years in the Engineering Dept. at the university, Mr Farvis has evolved a new electrical engineering degree curriculum, founded the post-graduate diploma course in electronics and radio and built up a research school on various types of gas discharge. Earlier he was a lecturer at the University College, Swansea, for three years, where he had previous teaching experience before joining the Air Ministry Research Establishment in 1940 for work on the redevelopment of new decimetric radar systems. In 1941, Mr Farvis transferred to work on the radio defence of London against German raiders using radio beams. For the remainder of the war he headed a large counter-measures group and immediately before the end of hostilities was attached to Sir Robert Watson-Watt's team investigating German research establishments engaged on radio warfare.

With the opening of a new Croydon depot by AEI Lamp and Lighting Co. Ltd., **Mr A. P. Judd** is appointed area superintendent there to succeed **Mr W. Steer,** who is retiring shortly. Mr Judd joined the Edison Swan Electric Co. in 1951 and is already well known in the Croydon area. He has been a lighting engineer with AEI Lamp and Lighting Co. since the company was formed in 1956.

At a meeting of the Electrical Floor-Warming Association last week, **Mr R. F. Weaire,** M.I.E.E., was re-elected as chairman of the association. Mr Weaire is manager of the Panelec Heating Division of British Insulated Callender's Cables Ltd.

Mr J. K. Laughton has been appointed divisional manager of the Telecommunications Division of the Plessey Co. Ltd. He has been with Plessey since early 1958 when he joined the Telecommunications Division as sales engineer. Thereafter he became, successively, sales manager, executive assistant to the general manager, and manager of the Division's advanced development laboratory at West Leigh, Hampshire—from which position he takes up his new appointment. Before joining Plessey, Mr Laughton had a successful career in the Royal Navy. After early training at the Royal Naval College, Dartmouth, in 1937, he later specialised in communications and radio warfare. He was promoted to the rank of commander in 1954. His career in the Navy culminated in 1957 when he was assistant director of Radio Equipment (Communications) at the Admiralty.

Mr S. W. Graefe has been elected chairman of the Midlands branch of the Electrical Trades' Commercial Travellers' Association, with **Mr G. W. Arnold** as vice-chairman.

Newly appointed chairman of the New Brunswick Electric Power Commission is the **Hon Donald C. Harper,** and the new vice-chairman is **Mr H. G. Atkinson,** who has held executive positions with several industrial concerns, including the Abitibi Power and Paper Co.

Mr J. L. Pearce has been appointed district commercial engineer in South District of No. 1 sub-area of the North Western Electricity Board. (*ESH, page 157.) That district embraces Cheadle, Cheadle Hulme, Wythenshawe, Northenden and Didsbury. Mr Pearce was previously with the Board in West Lakeland, leaving in 1957 to become first assistant district commercial engineer in the Consett district of the North Eastern Electricity Board.

Mr H. I. S. Catherwood, M.A., joined Sigmund Pumps Ltd. as sales director on 1 Nov. He succeeds **Mr H. P. Lord,** who has been appointed managing director of International Boilers and Radiators, a sister company in the Booker group. Mr Lord will continue to be a director of Sigmund Pumps Ltd.

A former director of Bowler and Sidney Ltd., **Mr D. L. Sidney** has been appointed home sales manager of the Electrical Division of Auto Diesels Ltd., in succession to **Mr E. Ward,** who has joined Astley Industrial Trust Ltd.

After 38 years' service with the General Electric Co.'s Publicity Department, **Mr "Bill" Bailey** has retired. To mark the occasion he was presented with golf clubs and an electric blanket by his many friends in the GEC.

Mr T. E. Daniel

Mr T. Coates

Mr A. P. Judd

Mr J. K. Laughton

Mr J. Ireland

Mr J. Cooper

Mr A. Hession

Mr G. Casson

Mr P. C. Phillips

The British Driver-Harris Co. Ltd. announce four new appointments which have been made at their main plant at Cheadle Heath. **Mr John Ireland** becomes general manager of the Cheadle Heath plant; **Mr John Cooper** is appointed works manager, with two newly appointed assistant works managers—**Mr Arthur Hession** (wire) and **Mr George Casson** (strip). All four men have been with the company for many years and are widely experienced in the practical problems involved in the production of electrical resistance materials.

Mr J. E. Wall has been appointed managing director of Electric and Musical Industries Ltd. He recently joined the board of Morphy-Richards following that company's acquisition by EMI.

Manager of the Leeds branch of the General Electric Co. Ltd. since 1950, **Mr F. Smith** is retiring at the end of this year after 41 years of service with the company. He started as an assistant branch engineer after gaining experience with the Keighley Electricity Dept.

Formerly signal engineer to the Scottish Region of British Railways, **Mr L. J. M. Knotts** has joined Mullard Ltd. and will act as the company's technical adviser on the application of electronics to railway signalling and communication systems.

Previously commercial manager of the Towcester Division of the Plessey Co. Ltd., **Mr W. N. Richardson** has this week joined Hughes International (UK) Ltd. as marketing manager. Earlier, he was general sales manager of Salford Electrical Instruments Ltd. With his headquarters at Hounslow, Mr Richardson and his sales staff will be concerned initially with the semiconductor ranges of Hughes Aircraft Co. Activities will be extended to cover other commercial products, including parametric amplifiers, advanced types of c.r.o.'s and associated equipment.

Ascot Lamps and Lighting Ltd. announce the following reorganisation of their field sales force: Field sales manager is **Mr P. G. Leven;** the northern area manager is **Mr. S. Shaverin,** covering Yorkshire, Northumberland, Durham; London area manager is **Mr R. F. Marling,** covering N.W./W. London, Herts, Beds, Bucks, Oxfordshire and Berks. Area representatives are: **Mr F. A. Fleming,** covering West Scotland, Cumberland and Westmorland; **Mr R. Henderson,** covering East Scotland; **Mr R. Ragione,** covering Lancs, Cheshire and N. Wales; **Mr J. A. Spillane,** covering Midlands; **Mr S. G. Aldous,** covering Derbys, Leics, Lincs, Norfolk; **Mr S. Baars,** covering N. and E. London, Essex, Suffolk, Cambs; **Mr A. P. Ubank,** covering S. W. England and S. Wales; and **Mr. C. K. Heffernan,** covering S. London, Hants, Surrey, Sussex, Kent. Agent for Northern Ireland is **Mr G. M. Gardner,** of Campbell Gardner and Co. Ltd.

The new chief engineer of the Yorkshire Electricity Board is to be **Mr P. C. Phillips,** B.SC.(ENG.), M.I.E.E. He will succeed **Mr J. D. Nicholson** on 1 Jan., 1961 (*E.S.H., page 141). The board state that the unsuccessful applicant in the final consideration was **Mr A. G. Milne,** M.I.E.E., A.M.I.MECH.E., A.M.B.I.M., district manager at Bristol to the South Western Electricity Board. Mr Phillips has been deputy chief engineer of the Y.E.B. since October, 1956. From 1948 he had been with the Merseyside and North Wales Electricity Board, initially as assistant chief engineer (planning) and, from 1955, assistant chief engineer (operations). Prior to vesting day he was with the Edinburgh Corporation undertaking as senior assistant distribution engineer.

Elected president of the Women's Engineering Society is **Mrs I. H. Hardwich,** M.A., A.M.I.E.E., A.INST.P., of the Research Department of Associated Electrical Industries (Manchester) Ltd., at Trafford Park. After graduating in Physics at Cambridge, Mrs Hardwich joined Metropolitan-Vickers in 1941, and following two years' electrical engineering apprenticeship became a member of the Electron Microscopy Section of the Research Department. Later she moved to the Physics Section, where she worked on Geiger counters, X-ray equipment and the development of X-ray diffractometers. She is now a member of the Physical Metallurgy Section, and in May of this year also took over the duties of Supervisor of Women in the Research Department. Mrs Hardwich is a founder member of the Society's Manchester branch, in which she has held all executive positions, and has been a member of the National Council of the Society since 1946. She became a vice-president in 1956, and for the period 1952 to 1956 was editor of *The Woman Engineer.*

Mr C. H. Crowlie, a director of Hoover (Washing Machines) Ltd., has retired from Hoover on completion of 40 years' service with the company.

Mr H. D. Binyon, group products sales director, and **Mr D. J. Hendry,** export manager, International Division of the Solartron Electronic Group, are now on a business tour of the Far East, being due to return on 1 Dec.

OBITUARY

Mr J. Billcliff, A.M.I.E.E., organisation research officer of the East Midlands Electricity Board, died on 22 Oct., aged 51. Born at Barnsley and educated at Preston Technical College, he served with the Corporation undertakings of Eastbourne and Cheltenham and, in 1947, was appointed deputy engineer and manager at Nuneaton. He became manager of the Nuneaton District of the Board in 1948, relinquishing that appointment in 1959 to become organisation and research officer at headquarters.

Mr H. A. Lamb, M.I.E.E., general manager and director of Aberdare Cables Ltd., died on 13 Oct., aged 53. After war service as a staff captain with REME he joined South Wales Switchgear Ltd. as chief technical engineer. In 1951 he was appointed general manager of the associated company, Aberdare Cables Ltd., and later became a member of the board of directors.

Sir Cecil Weir, K.C.M.G., K.B.E., M.C., who died on 30 Oct. aged 70, had served on many Government bodies in addition to his immense activity in commerce and industry. Just over two years ago he was chairman of the committee which reported adversely on proposals for co-operation between gas and electricity boards. In recent years he had been chairman of the British Tabulating Machine Co., on the boards of the Pyrene Co., British Enka Ltd., and a part-time member of the British Transport Commission. Earlier, he was for two years chairman of the Dollar Exports Council.

Mr C. F. Jackson, J.P., a director of Lancashire Dynamo and Crypto Ltd. and general manager of its Willesden factory, has died aged 56. He joined Crypton Equipment in 1936 and Lancashire Dynamo and Crypto in 1941.

* *Denotes revision to the "Electricity Supply Handbook, 1960."*

Lighting fittings in production

ATLAS EXPAND FACTORY SPACE AT SPENNYMOOR

ONE-AND-A-HALF million 5 ft fluorescent lighting fittings a year! That is a very rough estimate of the equivalent output of lighting fittings of all sizes from the three Atlas factories at Spennymoor at the present time. Put another way, if a week's output were to be laid end to end it would stretch for some 30 miles.

It is less than ten years since the company of Thorn Electrical Industries first opened their factory at Spennymoor with a staff of 200, including a nucleus of trained personnel from the company's Enfield factory. The site, an ex-war ordnance factory, was a depressing collection of single-floor huts and buildings to the economical standard of all such places erected in wartime, surrounded by semi-derelict buildings, worked-out collieries and mineral workings and bearing the hopeless atmosphere from the mid-'30s depression.

Most of the buildings were taken over as they were by the incoming companies and converted, at the minimum expense, to their new purposes. Within the last few years the older buildings have been replaced by newer ones, of which the latest, "T" shop, sited close to the entrance to the factory estate, not only introduces some elements of external brightness but, internally, is laid out on an open and airy scale which delights those who are fortunate enough to work there. Moreover, there is room for expanding the buildings in two directions as production demands require.

The new building is the third on the site to produce fluorescent lighting fittings and control gear for the Thorn group and today, together with the adjacent buildings producing "Tricity" cookers and radio receivers, there are well over 3,500 local inhabitants employed, a most welcome state of affairs in an area which has known long periods of unemployment and despair.

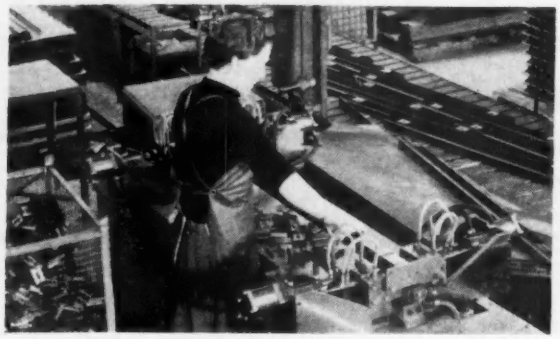
The Control Gear Factory

The necessity for the new premises was largely due to the exceptional demand for the Atlas super-slim "Popular Pack" fittings last year and the introduction of 8 ft 125 W fittings into the standard range. A new design of slim control gear is a vital factor in the super-slim fittings and "T" factory is laid down mainly for the production of the control gear and its assembly into the fittings ready for packing and dispatch. Only the starter switches and fluorescent tubes are manufactured at the Enfield plant.

The layout of the factory is on the production line basis, there being two main flows with overhead conveyor systems. The first draws the basic laminations and allied parts from the stores and passes them down the lines, where they are met by the already-wound coils, assembled, gaps adjusted against c.r.t. presentations, sealed in position with bonding cement, the wire ends "fished" out, insulated and connected to the terminal blocks and housed, together with the condensers, in metal cases. The conveyor line then takes the assemblies to the impregnation plant.

After impregnation—there are three forms, varnish, "Permaset" and compound—the ballast units then travel by the second conveyor to benches for further test, inspection, marking and sealing. They are then ready for transmission to stores or to the assembly benches for incorporation in the fittings. Compound-filled ballasts are now falling out of production, being largely replaced by the resin-impregnated types. For high ambient tempera-

General view of the new fluorescent lighting production lines laid down for the super-slim "Popular" and 8 ft fittings at Spennymoor



An example of automatic assembly in the Atlas plant. In this jig straps are positioned and spot-welded at eight points to the back of the batten spine. Average time for process, 15 seconds

tures, "Permaset" compound—a Thorn development, incorporating epoxy-resin and sand, with a high thermal conductivity—is recommended. The resin being thermo-setting, it will not subsequently melt or spill.

The Lighting Fittings

In the press shop a large number of press brakes are constantly producing the metal sections in the right length for the spines, ready pierced for lampholders, starter switches and fixing screws. Bridging straps and end-plates are rapidly attached and spot-welded into position on combined jigging and welding units which make the welds simultaneously. The average time for a complete welding operation is of the order of 15 seconds.

The finished sections are then degreased, phosphated and electrostatically sprayed—except for the 8 ft units and specials which are, for the time being, hand sprayed—on conveyor lines, emerging from the drying booths in a steady stream under the skilful gaze of inspectors before transmission to the assembly benches.

The wiring looms are, meanwhile, being assembled on peg-boards, taped, cut and trimmed at an astonishing speed ready for insertion in the fitting, together with the ballast units, lampholders and starter holders. After inter-connection, the completed fitting is passed to a test bench where fluorescent tubes in racks are connected by wander-leads to the lampholders, the unit switched on and per-formance checked. A final inspection and packing completes the operation.

The lampholders and starter-switch bases are also moulded on the premises. In the moulding shop British and American thermosetting moulding presses of the auto-matic type produce them continuously, in phenolic and alkyd compositions, without supervision other than seeing that the hoppers are full and that the finished mouldings are carted away.

Throughout the process quality control techniques are continuously applied and the latest and most efficient machines from Britain or America are used wherever they can assist in improving or accelerating production. The coil winding machines, of the multi-winding type manu-factured in both countries, compete side by side, drawing their wire from 100 lb spools, six or eight of which are required to service each machine.

Over 100 tons of copper and iron and 10,000 miles of enamelled wire are used every week for choke manufac-ture alone. Fluorescent fittings production accounts for 4,000 tons of steel sheet a year. To ensure that the chokes and quickstart units are not noisy, samples are taken at regular intervals from production and checked in a silent room. All of the units, of course, comply with British Standards and are entitled to bear the kite mark, the first of British-made control gear to be accorded this distinction.

Production

In the last five years the production of fluorescent lighting fittings and control gear has increased by between 300% and 400% and it is confidently claimed that present figures will be doubled in the next two years. Already, plans for further factory extensions are in hand and build-ing will commence during the coming year.

It is claimed that the present factory is not only the most up to date in Britain but also the largest; in fact, it might well qualify as the largest in the world for, though bigger output has been achieved by American companies, on account of the long distances there, it is more usual to break production into smaller units widely dispersed.

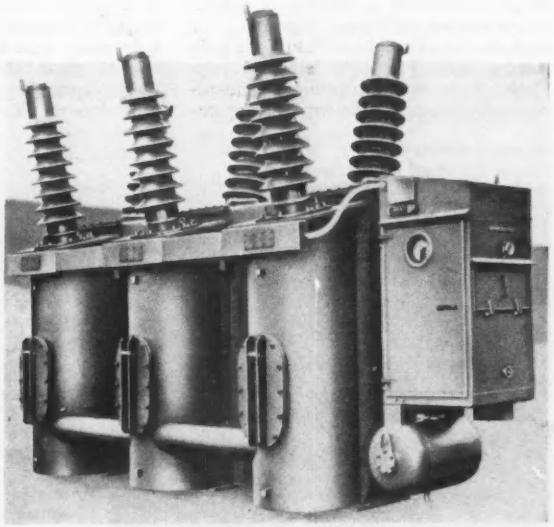
The factories are producing not only for the Atlas Lighting section of the group but also for the Smart and Brown and Ekco-Ensign companies. A considerable pro-portion of the output is exported, where lighting fittings of all three companies are in demand.

The old "Popular Pack," first introduced in 1955, was one of the first high-class fittings to be marketed at an economic price complete with tube ready for installation. The million mark in sales was passed in under four years but the super-slim successor is confidently anticipated to pass the same total in less than half the time, and produc-tion has been programmed accordingly.

During the Press visit to the works, the route led through the shops where "Tricity" cookers were in pro-duction. Here, there was the same almost frantically energetic effort to keep up with demand for both the Viscount and Marquis models.

All the products of the Thorn factories at Spennymoor are transported to the distribution centres throughout the country mainly by road. This ensures that a fitting urgently required can be available anywhere in Britain for installa-tion within 24 hours of manufacture.

NEW CIRCUIT-BREAKER



This recent addition to the AEI Switchgear Division range is a 132 kV breaker, 2,500 MVA, built in three-tank monobloc form to give easy shipping. The design has 60% less oil content than a conventional 132 kV o.c.b.

equipment for industry

Semiconductor range

FURTHER additions to a wide range of semiconductor devices are announced by Texas Instruments. These include a series of silicon controlled rectifiers for power switching 1 A at up to 400 V, maximum gate current required being 20 mA; they supplement an existing range having a rectified current rating of 3 A. Also included are high voltage silicon rectifiers carrying 250 mA at up to 6,500 V. Among devices for computer applications is what is claimed to be the first commercially available gallium-arsenide tunnel diode together with germanium and silicon "mesa" transistors for high-speed switching operations up to 50 Mc/s. In addition, a silicon light sensor is available having a response time of 4μ sec suitable for punched card scanning. As well as an existing range of general purpose n-p-n silicon transistors, complementary p-n-p silicon alloy type can now be supplied operating at −55°C to 150°C. *Texas Instruments Ltd., Dallas Rd, Bedford.*

Demonstrating electromagnetics

TO assist science teachers in demonstrating fundamental electromagnetic phenomena a series of model units have been devised. These consist of various permanent magnet assemblies, tapped multi-turn coils and other auxiliary apparatus. Using the assemblies singly or in conjunction, a number of experiments can be performed illustrating, for instance, the principle of induction, eddy currents and Fleming's left-hand rule. Slotted bases can be supplied for mounting the equipment. Moving-coil apparatus is also available by means of which working principles of the motor, dynamo and electrical instruments can be demonstrated. Another item is a torsion balance assembly for measurement of force on a conductor in a magnetic field. Transparent plastics are used in construction of the equipment, making visible all moving parts and connections, the latter being clearly marked. *Griffin and George Ltd., Ealing Rd, Alperton, Wembley, Middx.*

Industrial radiant heater

A RECENTLY introduced industrial radiant heater has dimensions of 24 in. by 4⅜ in. by 2½ in. and is suspended by means of slotted brackets which permit adjustment to four angles of inclination. Fabricated in specially coated sheet steel, it has a nickel-plated mirror-finish reflector with 10 s.w.g. guard wires. Elements available are 500 W, 750 W and 1,000 W, black heat, and 350 W, 500 W and 750 W, silica sheathed for either 200/220 V or 230/240 V. List price is 63s. *British Central Electrical Co. Ltd., Briticent Hse, 6 and 8 Rosebery Ave, E.C.1.*

Electrical combination lock

DEVELOPED in the USA, an electrically operated combination lock consists of a dial unit incorporating multiple contacts which can be operated in a pre-set sequence to control an electromagnetic locking circuit. As many as four such circuits can be controlled by dialling four combinations, thus one dial unit can be used to lock or unlock four drawers of a cabinet individually. Combinations can be easily altered if necessary and, as an additional precaution, the unit can be unplugged from the circuits, acting in effect as a master key. Besides having obvious advantages over its mechanical counterpart, there is scope for its application in safeguarding electrical or other equipment from unauthorised operation. *Code Designs Ltd., Oldfield La, Greenford, Middx.*

Welding equipment price reduction

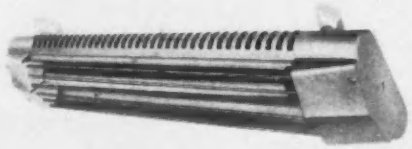
A PRICE reduction of 10% is announced by Lancashire Dynamo for their series CRW.1 resistance welding control equipment. This covers a range of 42 different types, each housed in a standard cubicle assembly and catering for synchronous spot, seam and pulsation welding. The same company have released details of a further addition to their F.43 "Electromagnetic" counter range. This has first wheel digits 0-11 and counts multiples of 12. Two versions are available having maximum counting speeds of 1,500 and 2,400/min. respectively. The new models retain all features of the original series, including plug-in construction and re-set facilities. *Lancashire Dynamo Electronic Products Ltd., Rugeley, Staffs.*

Solenoid-operated valve range

A RANGE of solenoid-operated valves new to this country cater for control of compressed air, non-corrosive gases, low-pressure steam and hydraulic fluids. Single, three- and four-way types are available having valve bodies of brass, stainless steel or plastics. Standard models operate on the held-open principle, reverse operation types being also available which will close against fluid pressures of up to 1,200 p.s.i. There are also impulse-operated types, independent of mains supply, and some designed for repetitive operation up to a frequency of 800/min. Coils are continuously rated for a.c. or d.c. at voltages specified to order.

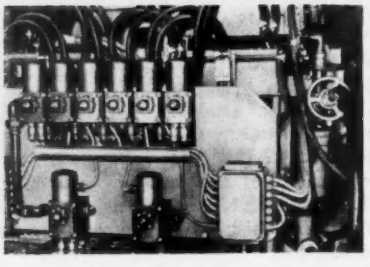
Concurrently available is a range of pressure sensitive switches suitable for incorporation in pneumatic or hydraulic control systems and operation of alarm signals. The pressure-sensitive element operates a snap-action single-pole change-over switch, having various ratings, a typical one being 5 A at 250 V. Maximum operating pressure for the range is about 5,000 p.s.i., while a special model is available for low pressures in the region of the equivalent of 3·5 in. of water. *Londex Ltd., Anerley Wks, 207 Anerley Rd, S.E.20.*

Industrial radiant heater by British Central Electrical can be used for black heat elements, rated up to 1 kW, or silica sheathed elements up to 750 W



These pupils are being shown an experiment constructed from a series of components made specially by Griffin and George for science teaching

A group of "Londex" solenoid-operated valves controlling air flow. Similar valves can be used for controlling non-corrosive gases, l.p. steam and certain fluids



for the electrical trade

A trio of "Packaway" 'fridges

THE basic styling of Prestcold's "Packaway" refrigerator has been applied to their whole 1961 range, it is announced. The result is that three models now incorporate the principles that won "Packaway" the Design of the Year award and the Duke of Edinburgh's Prize for elegant design; they are: "Three," "Five" and "Eight." The smallest is the original model, built for compactness and harmony with other kitchen units, but it incorporates some important modifications. It now has three shelves instead of four and a tilting flap now covers one of the door racks. Freezing compartment shutter is black. The normal catch has been dispensed with and the door now seals magnetically. These features, and the original styling, have been applied to models "Five" and "Eight," both of which also include interior lighting and wheel mountings. The larger model has level adjustments and a braking device, eight door racks, five shelves, including the capacious crisper tray, and a full-width freezer. The smaller models can be supplied with coloured worktops as optional extras. Prices and capacities are as follows:

"Three"	3·1 cu ft	£52 10s
"Five"	5·2 cu ft	£69 6s
"Eight"	8·1 cu ft	£93 9s

A wall-mounted version of "Three" is priced £51 9s. *Prestcold Division of Pressed Steel Co., Cowley.*

Brand new "Infraphil"

COMPLETE redesigning of the well-known "Infraphil" medical infra-red lamp has resulted in a totally different unit which is to be marketed as a new model retaining the original name. Though its general appearance has been altered, the highlight of the new model is its moulded lens—a glass pressing in a series of concentric prismatic sections. Infra-red rays are concentrated into a beam 4 in. in diameter at 10 in. distance. New methods of forming are said to have improved the reflector and lens as a combined optical unit, whilst the filament is more accurately placed in relation to them. Rating is 150 W, and life 300 hours approximately. Price £4 17s 6d. *Philips Electrical, Century Hse, Shaftesbury Ave, W.C.2.*

Mercury fluorescent price cuts

SUBSTANTIAL reductions in prices of mercury fluorescent lamps are announced by two manufacturers, Philips and Stella. MBF/U 250 W colour-corrected lamps are now priced £4 4s—a drop of 15s—while the larger internal reflector types, MBFR/U 250 W colour-corrected lamps, are reduced by £1 to sell at £5. These alterations were effective from 1 Nov. *Philips Electrical, Lamp and Lighting Group, Century Hse, Shaftesbury Ave, W.C.2; Stella Lamp Co., 158-160 Shaftesbury Ave, W.C.2.*

Canadian-style kitchen luxury

A SELECTION of kitchen appliances from Canada is about to be launched into the luxury market here. Units under the trade name "McClary-Easy" will include washing machines, clothes dryers and air conditioners, whilst four cookers and four refrigerators are available at once.

The cookers incorporate most labour-saving devices known to us, and some others not so familiar. There is no mistaking the transatlantic designing of these units, with their broad fronts, widely spaced hotplates and impressive panel of controls. The ovens incorporate rotisseries and fulfil the functions of an ordinary grill. There is no splashplate, a raised rear panel bears the switches. Finer points are an extra socket-outlet for lesser appliances, such as mixers, and "meat-minder" probes which are pushed into joints during roasting to operate a pre-set cutout when the desired interior temperature has been reached. More familiar features are: automatic timing, glass oven doors, interior lighting and warming drawers. Prices range from £123 18s, tax paid, to £142 16s.

The refrigerators are: two 10 cu ft models, one 11 cu ft model and one 13 cu ft model. The smaller cabinets are noteworthy in that they are slim for all their large capacity, requiring little more than 4 sq ft of floor space. They feature very large freezers and automatic defrosting. Door shelves and drawers in blue, and aluminium freezer doors are in keeping with the smart exteriors. An unfamiliar feature of all models is the chrome trimming around the doors—this and the unusual design of handles stamp these smart cabinets with a final touch of luxury. Prices range from £121 16s to £172 4s, including purchase tax, and £3 3s service fee. *General Steel Wares, 259 Marylebone Rd, N.W.1.*

"Thermalay" range grows

THE popular "Thermalay" range of electrically heated carpet underfelts now includes three further sizes. They measure 3½ yd by 2½ yd, 4 yd by 2½ yd and 5 yd by 2½ yd, and their introduction brings the total number of sizes available up to ten. Odd lengths of underfelt in widths up to 108 in. can be obtained from stock to fill in odd spaces. *Thermalay Ltd., Shelf, near Halifax.*

Convector with a difference

A FLOOR-STANDING convector heater to be introduced this month can be transformed into a clothes dryer, complete with racks, in a few moments. Basically it is of familiar upright design, a shallow cabinet standing about 30 in. high with an opening at the bottom and a louvred outlet at the top front face. The front panel, however, pulls downward to lie horizontal to the ground and in this position the usual air diffuser is revealed—a rectangle of expanded metal concealing the element. Racks are unfolded and supports engaged over the heating unit and the transformation is complete in three movements. The new convector-heater and dryer is called "Straightaway"; its rating totals 2 kW with two-heat control and pilot light. Castors are fitted and it sells at £13 17s 6d, tax paid. *Barber Electrical Services, The Airport, Weston-super-Mare, Somerset.*

"Packaway Eight." Biggest of Prestcold's 1961 range. Price £93 9s.

"Straightaway," a compact heater that becomes a dryer at a moment's notice

The changing lamp shape

FOLLOWING the trend toward "mushroom" shaping of domestic lamps, Crompton Parkinson have announced the "Newshape" model in wattages up to 150. Prices are as follows:

40 and 60 W	1s 8½d
100 W	1s 11½d
150 W	2s 10d

These figures include purchase tax. *Crompton Parkinson, Crompton Hse, Aldwych, W.C.2.*

Cantilever tube fitting

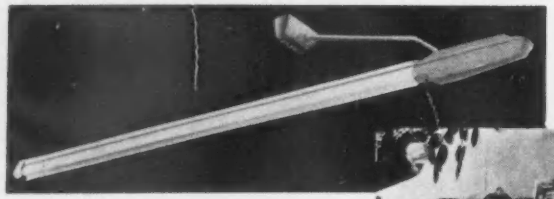
AN elegantly designed domestic fluorescent ceiling fitting, "Netaline Luminaire," is to be marketed in the north west. An excellent example of simple yet decorative styling, it is suspended by a single cantilevered arm. The cover, where the arm meets the end of the tube, is slim and smoothly modelled and the cap at the farther end unobtrusive, thus the fitting owes its decorative appearance purely to the angle of arm and tube. It is easily installed with fixing accessories supplied and employs a 40 W 4 ft warm-white tube. Available in pastel shades of blue, yellow and lilac, this fitting is obtainable at present in Cumberland, Westmorland, Lancashire, Cheshire and parts of North Wales. Price £3 19s 9d, including purchase tax. *AEI Lamp and Lighting Co., Melton Rd, Leicester.*

New infra-red wall heater

A 1 kW infra-red heater for £5 3s 6d is the latest appliance introduced by Grubbs. The new heater, "Barry," a wall mounting model with cord switch, has a finish of hammered gold and silver with cream end-plate. Length is 2 ft. *Grubb Engineering Co., Mary St, Birmingham 12.*

Plate-warmer for the table

AN interesting application has been found for the "Mhoglass" mesh-type element in the Morheat Hotplate, a plate-warming unit for the table. It comprises a heated panel of "Mhoglass" non-metallic element sandwiched between two boards of Swedish Masonite, supported on tubular legs of white plastics-covered metal. The supports also incorporate handles at each end of the board—an economic design with a pleasing contemporary touch. The board is finished in silver-grey stove enamel. The hotplate measures 28 in. by 8 in., has a rating of 125 W, and sells at £5 5s tax paid. *Morheat Ltd., Church Path, Fareham, Hampshire.*



"Netaline Luminaire," the novel cantilevered fitting by AEI. Price: £3 19s 9d ▲

Morheat's smart hotplate for the table. £5 5s ▼

TRADE PUBLICATIONS

EKCO.—Large coloured wall-chart providing rapid guide to domestic and industrial heating units. Ekco Heating, E. K. Cole Ltd., 5 Vigo St, W.1.

STRAND.—"Lighting for Entertainment." 32-page coloured catalogue of stage and studio lighting equipment and accessories. The Strand Electric and Engineering Co., 29 King St, W.C.2.

G.E.C.—New edition of "Living Electrically With G.E.C." 39-page coloured catalogue and price-list of appliances. Also full colour folder describing the new Treasure cooker. G.E.C., Magnet Hse, Kingsway, W.C.2.

WIGGINS.—Technical leaflet on bitumen compounds in reactor shielding. Berry Wiggins and Co., Field Hse, Breams Bldgs, Fetter La, E.C.4.

T.C.C.—Technical Bulletin No. 9: "Flexistrip" flat-form multi-way cable; No. 68: Miniature tubular electrolytic condensers; No. 70: Sub-miniature tubular electrolytic condensers; and No. 72: Miniature tropical paper condensers, low voltage "Metalmite" range. The Telegraph Condenser Co., Radio Division, North Acton, W.3.

FERRANTI.—54 new data sheets for Technical Handbook, Vol. I—Valves and Cathode Ray Tubes, with instructions for insertion of sheets and removal of 22 superseded or obsolete sheets. Ferranti, Electronics Dept., Gem Mill, Chadderton, Oldham, Lancs.

GRIFFIN.—Eight-page pocket booklet outlining principles and uses of electric blankets, entitled "What Good is Warmth if You Worry About It?" David Griffin Ltd. (manufacturer of "Dee Gee" blanket), 33 Henrietta St, W.C.2.

A.A.—Circular announcing anodising processes by Alumilite and Alzak Ltd., Priory Wks, Station Rd, London S.W.19.

MARTINDALE.—Two leaflets: "Pulley gear and flywheel bearing pullers" and "Bearing wedges" with price lists. Martindale Electric Co., Westmorland Rd, N.W.9.

VOLEX.—14-page booklet, "The Gardener's Heating Cable," describing system of "Do-it-yourself" soil warming. Volex Electrical Products, Salford 6.

MOPUMP.—Ten-page brochure of boiler feed pumps in the SC range. Rhodes, Brydon and Youatt, Reddish Engineering Wks, Stockport.

STC. — 116-page illustrated technical brochure. "STC Products for World Railways." Standard Telephones and Cables, Connaught Hse, 63 Aldwych, W.C.2.

INTERNATIONAL RECTIFIER.—Bulletin SR-2006 on range of selenium rectifiers and price list. International Rectifier, Hurst Green, Oxted, Surrey.

BALZERS.—Pamphlet listing vacuum pumping systems in German, French, English and Italian. Balzers High Vacuum, 1 Mornington Terr, Regent's Park, N.W.1.

Nine-line Start for Bridges

THE entry of S. N. Bridges, manufacturers of electric home tools, into the appliance field is marked by nine attractively designed yet moderately priced products. There are three table-cooking units, three electric blankets, a fan heater, food mixer and hair dryer in this range, which is known as "Luxury Life."

The most expensive item is the fan heater, a three-heat model with a top output of 2¼ kW and two fan speeds. It is of conventional floor-standing design, but boasts the unusual feature of square push-button controls. These are placed neatly under the handle on the top of the casing. Two neon lights, one above and one below the grille, indicate when the heater is wired and connected properly and when it is actually in operation. The usual cut-out device is incorporated. The new fan, available in gold/black, red/black or two shades of grey, sells at £10 17s 6d, tax paid.

The food mixer is a hand-held model with a single paddle inserted directly into the short cylindrical casing. Its attachments are a whisk, a beater, a three-bladed mincer and a coffee-grinding attachment. Price £8 19s 6d complete.

A range of three electric blankets comprises a single bed 92 W version in satin with neon-lit bedside control. It measures 60 in. by 30 in. and is priced £5 5s. Its double-bed counterpart, at £7 15s, has a 120 W loading. The luxury model has independent control of the two halves. Loading of 95 W is controlled by a five-position switch. Known as "Royal Rest" it is priced £9 9s.

Highlight of the cooking range is a griddle hot-plate for table use with 1,500 W rating. It measures 18¼ in. by 11¼ in. and stands on four small legs. Price £9 9s. Two other table appliances are a skillet and a cooker/boiler at £6 19s and £8 1s 6d, respectively. The 11 in. diameter skillet has a loading of 1,200 W and sells complete with oven glass lid which acts as a serving dish. The 1,350 W cooker/boiler deep frys, roasts, boils and bakes. Like its companion model, its glass lid doubles as a serving dish. A frying basket is included in the purchase price. Each of the three cookers above is to be used with the "Selectrol" thermostat connector.

A pleasing feature of the hair dryer is the way in which it is designed to stand upright or hang on the wall as well as rest comfortably in the user's hand. It eliminates the expense of an extra standing support, which has been required by some previous makes. This model is available in pink, mauve or white. Rating 400 W, with a manual resetting safety cut-out. Price £3 13s 6d tax paid. *S. N. Bridges and Co., York Rd, Battersea, S.W.11.*

Generation survey

I.E.E. CHAIRMAN OUTLINES FUTURE TRENDS

FUEL cells, thermo-electric and thermionic generators and MHD generators were under consideration as more direct and simpler means of converting fuel to electrical energy, said Mr A. C. Thirtle, M.I.E.E., in his address to the IEE Western centre. (Mr Thirtle is director of the Southern, S. Western and S. Wales CEGB region.) He was surveying developments in the supply industry over the last 40 years and indicating possible future trends in generation.

Electricity generation since 1920 had risen 26-fold and the peak demand had risen 18-fold. In the same period, the number of units obtained from one ton of coal had increased from 585 to 1,742 and sales of electricity per person employed in the supply industry had quadrupled.

He referred to the substantial reduction in transmission losses which had taken place and which was most marked by the reduction from 15·9% to 11·1% in distribution system losses during the first ten years after the grid began operation. Even so, he considered the present level of 8% units lost in distribution too high and that such a loss showed a need for capital expenditure on distribution reinforcement.

Plant Growth

The CEGB's future projects were based on a critical assessment of demand increase, estimated by the area boards for a forward period of seven years at each of their bulk supply points. Present plans provided for a net increase in generating capacity by 1965 of 37,500 MW, or 38%, over the five-year period; 55% of this generation would be in ten new stations, seven of which would be located at the coalfields and three near London. Extensions to existing stations and commissioning of the six nuclear stations would each contribute a further 21%, and the remaining 3% would come from the Rheidol hydro and Ffestiniog pumped storage schemes.

Advantages of larger sets were clearly indicated by the following comparisons. A 180 MW station with six 30 MW units required a building volume of 39·4 cu ft per kW. For an 1,100 MW station with two 550 MW sets the figure reduced to only 22·1 cu ft per kW. Generator weight for a 350 MW set was less than 40% of that for a 30 MW set per MW rating. Despite a 70% rise in material and labour costs over the past 12 years, station capital cost had fallen to £50 per kW and for the Thorpe Marsh station, due for commissioning in 1963, it was likely to be down to £40 per kW installed.

The Future

There was every reason to expect that demands in the next 20 years would continue to rise at the same rate as in the past 20 years. Even if this was so, it would not be until 1970 that consumption per head in this country equalled present consumption per head in USA and Sweden, and in those countries there was as yet no evidence of saturation. The probability was that plant capacity would have to be increased four times by 1980 and this implied 44 stations, each with 1,500 MW capacity. The problem of finding sites for such large generating units was considerable and was not lessened by the difficulty of obtaining routes for transmission lines acceptable to the public. Increased load capacity and some uprating to 380 kV would be necessary on the existing lines and already work was in hand on a 500 kV design using bundled conductors.

Only marginal improvements in the highest station thermal efficiencies could be expected, although average thermal efficiency could be raised much closer to the best stations and improved instrumentation would enable running costs to be more accurately assessed. However, even a 0·1% improvement in average plant efficiency represented a saving of £800,000 p.a.

National coal production was likely to fall slightly to about 200 million tons annually, but it was reasonable to assume that the CEGB's share would increase from the present 20% to about 48% by 1980. By that time, nuclear fuel might well be giving 33·5% of the total output.

Much thought had been given to improving the present low load factor and reducing cost of supply. The annual load factor was at present 47%, and although every effort was being made to develop "off peak" loads it was doubtful if a substantial change in load factor could be brought about. Although as much as 20% of annual demand lasted for only less than 6% of the year, it was not considered economical to install new plant, such as gas turbines, for peak load use but rather to provide high

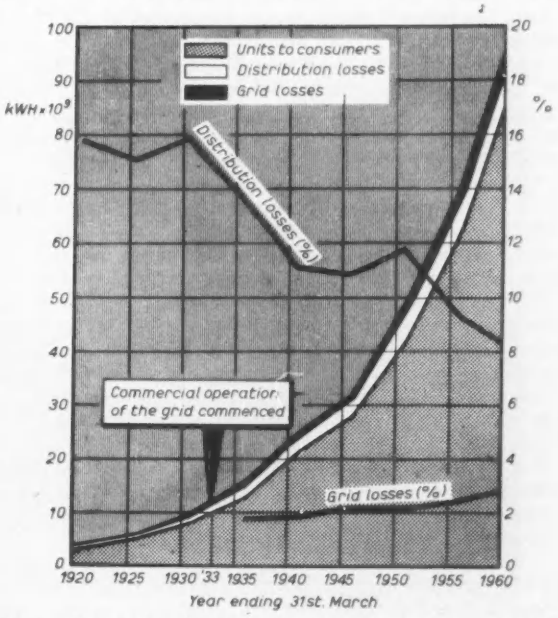


Fig. 1. The steady reduction in distribution losses is shown by this graph. In the ten years after the grid was introduced, distribution losses fell from 15·9% to 11·1%. Overloading subsequent to the war resulted in increased losses in 1945-50

merit plant to meet load growth and to operate fully amortised plant for short periods. Nevertheless, the South Western Board's 3 MW gas turbine installations were being watched with interest and the CEGB had recently ordered an experimental 15 MW gas turbine.

In concluding his address, Mr Thirtle referred to some of the research projects being pursued by the CEGB. The laboratories at Portishead were concerned with efficient oil burning, metal corrosion, burning of low-volatile coals and extended use of powdered fuel ash in cement products. The Board's application branch was examining problems of energy conversion previously referred to.

For example, in the MHD generator, although there was considerable difficulty with high temperature electrodes, by using a pulsating gas flow and fluctuating magnetic field, an a.c. electrical output could be induced in a separate system and the mean temperature of the hot gas system could be reduced.

Another project, concerned with hydraulic transport of coal over considerable distances, suggested that transport costs could be reduced to 40% of that by rail and ship for a distance of 150 miles.

In the last five years telemetering had improved, giving the control engineer more immediate information. Computers were now being considered to give economic operation with security of supply. Such computers would be supplied with data on load requirements and plant and system conditions, and would require a memory of plant characteristics and past load conditions.

The Telephone System

Aspects of the GPO system were described by two of this year's IEE chairmen. At the Southern Centre, Mr R. Goford, M.I.E.E. (Area Engineer, Portsmouth telephone area), outlined the structure of the telephone system and the duties of the staff.

Growth of the system, with particular reference to recent developments, formed the subject of the address to the South Midland Centre by Brigadier F. Jones, C.B.E., E.R.D., M.SC., M.I.E.E. (Telephone Manager, Birmingham area). He referred to the great advances which had been made possible, first by the introduction of automatic exchanges, and more recently by electronic techniques. Without the automatic exchange, the telephone system would have been virtually unworkable. Even though 80% of subscribers were connected to automatic exchanges, 50,000 operators were still employed.

The transistor, by reducing power and space requirements for telephone equipment, had made economical the introduction of electronics on a wide scale. An example was the recently introduced subscriber trunk dialling system which used electronic register translators to route subscribers' calls. A later design utilised magnetic drum storage. One such drum could accommodate 32,000 digits, and only four drums would be necessary to handle all outgoing trunk calls from the Birmingham area. Electronic techniques were also being applied to accounting. At present, preparation of the subscriber's account cost 10s. Since with STD all calls were billed together and individual calls could not be identified, it was considered necessary to submit accounts quarterly. Electronic accounting methods were being developed for automatic accounting, again using magnetic storage drums.

Two systems of economising in cable requirements were under investigation. In the first, a line connector was used designed to exploit the very small time for which the average subscriber's line was normally in use. Switching equipment in the local distribution system would connect one of a group of subscribers to a common line, so enabling the line to be more fully used. The second development was based on the Time-Division-Multiplex system used in telegraphy. For example, 100 subscribers might be connected through high-speed electronic switches to a single line for successive periods of 1 microsecond. Thus 100 conversations could be carried over a single transmission channel without excessive discontinuity or distortion of speech.

Science in Mechanical Engineering

THE place of science in mechanical engineering today was discussed by I.Mech.E. President, Professor O. A. Saunders, M.A., D.SC.(ENG.), F.R.S., M.I.MECH.E. (Imperial College), in his inaugural address last week. Although this provided the principal topic for his address, there was much of broader interest for the engineer specialising in other branches of the profession.

Dealing with advances in science, Professor Saunders stresses that the engineer of the future will always need to combine scientific knowledge with engineering experience. The "cut and try" element is characteristic of the engineer's work and progress would be slow, if not impossible, without it.

Broadly speaking, science contributes to engineering developments in three ways. It introduces new principles through which engineers can achieve their aims; it discovers new materials and production processes; and it shows how to improve general and detailed designs of appliances.

One of the difficulties of engineering organisation today is that no great advance has been made in enabling the young man to gain support for new ideas. This is because there are far more ideas competing together than previously, and assessment is becoming more and more difficult. Judging the value of new ideas requires rare qualities of breadth of knowledge and perception in individuals faced with the task. Professor Saunders suggests that the task of organising to take full advantage of new scientific ideas and developments, and encourage young men without undue waste of material and manpower resources, offers one of the greatest challenges to the coming generation.

Speaking as a university professor, the president suggests there are three basic aims for engineering education. These are:

1. Broad fundamental knowledge of the engineering sciences, with some degree of specialisation based on adequate physics, chemistry and mathematics.

2. Ability to apply academic knowledge to engineering problems of design and construction, including gathering together information preparatory to making decisions involving both technical and human problems.

3. Ability to express effectively, verbally and in writing, the necessary information to be conveyed to others.

So far as school training is concerned, the four essential elements of sixth form education for those aiming at an engineering career should probably be physics with chemistry, mathematics, a language, and history. These would be appropriate when pressure to enter a university is less intense than at present.

Old Faradians Entertain

A CHANGE of venue and day marked this year's Old Faradians dinner which was held last Friday at Quaglino's instead of, as on previous occasions, at the Savoy, As the chairman of the Association, Lt.-Col. R. W. C. Reeves, explained when proposing the toast of "our guests," this had been in deference to the guest of honour, Sir Hamish D. MacLaren, K.B.E., C.B., D.F.C., President of the I.E.E., who would, in the next 48 hours, relinquish the post of Director of Electrical Engineering at the Admiralty which he had held for so long and with such distinction. The task of handing over to his successor made Friday a more convenient day than Thursday and this date was already booked at the Savoy.

Sir Hamish, replying for the guests, said that they all regretted the passing of the mighty battleships which, as the first of the line, had so long held pride of place in our hearts but this did not mean the end of the Navy. On the contrary, the service had a great deal to offer to the young engineers of today, both in service and civil positions, providing only that they had the technical training, ability, enthusiasm and an element of luck. He had, and he admitted it, had his share of the latter in his time.

Sir Harold Bishop, C.B.E., Director of Engineering, B.B.C., proposing the toast of "Faraday House," expressed the pleasure of all present at the appearance, his first after four months in hospital, of the Chairman of Board of Governors, Col. B. H. Leeson. As pioneers of the "sandwich system" which had produced so many outstanding practical engineers, the college could reflect with pride that it still remained self-supporting, unsubsidised and without any strings. Engineering students from all over the world had passed through its doors and would continue to do so for many years to come. Among the many distinquished guests present were Sir Leslie Gamage, M.C., Sir Josiah Eccles, C.B.E., M.M., Sir William McFadzean; Mr F. H. S. Brown, Deputy Chairman CEGB; Mr S. B. Warder, Chief Electrical Engineer, British Railways and Mr W. K. Brasher, C.B.E.

Clean Conditions Assembly Shop

ANTICIPATING the difficulty of clean conditioning complex reactor components on site, Stewarts and Lloyds Ltd., Pipework Engineering Division decided to design and have installed a permanent clean conditions assembly shop. This is now in service and is integral with the nuclear engineering section of the company's works at Tollcross, near Glasgow.

The necessity for ultra-cleanliness of plant components subject to radiation is well known. After preliminary degreasing, shot-blasting and vacuum-cleaning, component parts are treated with anti-rust coating and passed on for final assembly. The latter operations are carried out in dust-free surroundings where, also, the assembled parts are sealed off ready for dispatch to site. Efficient mechanical handling is important in order to prevent bottlenecks, particularly between the shot-blasting and coating stages where delays might initiate incipient rusting or contamination. This requirement is fulfilled at the Tollcross installation by means of electric hoists running on a monorail system.

Special Precautions

The actual clean conditions shop is immediately adjacent to the degreasing and shot-blasting units and covers a floor area of 7,000 sq ft. It is partitioned into two bays and is of dust-proof construction, having double glazing and rubber-sealed doors. The shop is supplied with electrically heated air at a pressure several p.s.i. above atmospheric and filtered to a dust particle size of less than one-thousandth millimetre. The interior is well lit and finished in non-contaminating gloss paint. To ensure a minimum standard of cleanliness, personnel must wear white clothing and boots provided in a changing room at the entrance.

Anti-rust coating is applied to component parts in the first bay of the clean shop by dipping. Several types of solution are used, one being a synthetic lacquer dissolved in trichlorethylene. The coating produced has the particular advantage that when the component is installed in a reactor the lacquer can be removed by volatilisation. Noxious vapours emanating from the dipping trough are drawn into extraction fan intakes in the sides of the trough and dispersed. Coated components are passed on to the second bay, which has a slightly higher air pressure than the first bay, where final assembly is performed and the inner bores are sealed with polythene end caps.

Part of Stewarts and Lloyds Ltd. clean conditioning shop at Tollcross. Monorail hoist can be seen with plenum pressurised air duct in the background. Trilac coated components being assembled are fuel rod stand-pipes for Hunterston nuclear generating station

News of the Week

NATIONAL APPLIANCE SERVICING

Scheme for annual maintenance charge proposed

THE early establishment of a national service organisation for domestic electrical appliances, providing uniform attention, uniform charges and quick service, has been suggested by Mr N. A. H. Stacey, economic and marketing adviser to the General Electric Co. Ltd. Speaking at the annual dinner of the South Staffordshire branch of the Electrical Contractors' Association he stressed that the essentials of such a scheme were yearly contracts at fixed prices.

His idea is for a uniform annual charge for maintaining equipment in perfect running order. No one had a monopoly of the idea, somebody would adopt it sooner or later and it was going to be a success with the increasing number of appliances in use, he told the "Electrical Times." In the United States, the General Electric were experimenting with a similar scheme in two States at present.

There was an immense opportunity to add to consumer welfare, he judged, and the time to think about service for electrical goods on a national coverage was now. Mr Stacey told the ECA members that the problems of mass production had been tackled, and those of mass consumption and mass financing were being tackled; we now want to effect mass servicing.

Earlier he had referred to the important position of the electrical contractor and retailer in transmitting quickly the suggestions and criticisms of the customer to the maker about electrical products, not only by reporting faults, but consumer preferences for colour and shape, for performance and usefulness. What the dealer thought of a product was important, "but what the customer thinks is vital," he said.

The electrical consumer goods industry was going through one of those periods of "readjustment" which have been taxing its ingenuity to the limit for the past ten years, but there was a prospect of better times, since the national economy was sound, consumer expenditure was still buoyant, and full employment was being maintained. But he urged that when credit restrictions were eased the industry should ask for a reduction of purchase tax on electrical goods. Purchase tax on electrical appliances, radio and TV, and certain other consumer items, totalled £106 million in 1959.

Signpost to Sizewell

REQUEST for further particulars in amplification of the tender for the Sizewell nuclear power station has been received by the English Electric Co. from the CEGB. This is taken in some quarters as indicating that the English Electric - Babcock and Wilcox - Taylor Woodrow nuclear energy group are likely to receive the contract for the station.

Early this year the Minister of Power announced his consent to the construction of a 650 MW station at this Suffolk coast site and at the time it was estimated that work would start in late summer. Subsequently, planned output from the station was reduced to 550 MW; but cooling water supplies and other features of the site are suitable for an output even greater than the 650 MW for which application was originally made.

350 MW SETS FOR TILBURY

THE CEGB have received the consent of the Minister of Power to establish a 1,400 MW power station close by the existing 360 MW station at Tilbury. The first section of the new station, with two 350 MW sets and two coal-fired boilers of 2,450 klb/hr evaporative capacity, is to be in operation by 1965.

N. Ireland dispute settled

THE dispute over a claim by clerical and administrative staff of the Electricity Board for Northern Ireland for parity with employees in the electricity supply industry in Great Britain has now been settled. The dispute originated two years ago and, after lengthy discussions, negotiations broke down last September, as we reported on 29 Sept. Some 400 employees then staged a ten-day strike before returning to work last month to allow negotiations on the outstanding differences to reopen between both sides under the auspices of the Ministry of Labour. These differences have now been resolved.

REFRIGERATOR SALES FALL

SALES of refrigerators fell sharply in September, but the export picture is brighter. British manufacturers' deliveries to the home market were 65% lower than in September last year. Retailers took only 27,248 refrigerators against 77,106 a year earlier. But, following buoyant sales early this year, deliveries to the home market for the nine months to September were still 20% higher than in the corresponding period of 1959. Exports for the nine months were up 42%, totalling 107,104 units, and the higher level was maintained in September.

PYE-EKCO MERGER PROPOSED

A MERGER of the businesses of Pye Ltd. and E. K. Cole Ltd., involving a share exchange and the formation of a holding company, is proposed by the boards of both concerns. One reason for the amalgamation is the present difficulties in the television industry, but both boards are convinced that considerable benefit will accrue from the merger because of the availability of greater resources, and on account of the complementary nature of many of the subsidiary and associated companies of both groups, particularly in the export field. At the present time the Pye issued capital is just over £7½ million, and that of E. K. Cole nearly £1·6 million.

Under the merger, the identity and individual operation of both groups will be maintained under existing managements, with Mr C. O. Stanley (of Pye) as chairman of the new holding company and Mr E. K. Cole as deputy chairman.

The proposed terms of the share deal would be:

One 5s Ordinary in the Holding Co. for every 5s Pye Ordinary;

Three 5s Ordinary in the Holding Co. for every two 5s Ekco Ordinary;

105 Cumulative Preference 5½% £1 shares in Holding Co. for every 100 5½% Cumulative Preference £1 units in Pye, and a similar exchange for Ekco Cumulative Preference shares.

187 Cumulative Preference 5½% £1 shares in Holding Co. for every 100 Ekco 7% Cumulative Participating Preferred Ordinary stock.

Both groups have a number of subsidiaries outside the radio and electronic sphere. Pye Ltd., for instance, in addition to its recently acquired Telephone Manufacturing Co., wholly owns such firms as L. G. Hawkins and Co., Lindley Thompson Transformer and Service Co., Unicam Instruments Ltd., W. Bryan Savage Ltd., Labgear Ltd. and W. Watson and Sons Ltd.

On the other side, E. K. Cole Ltd. has a major plastics business apart from a well-established electronics concern, a growing domestic electric heating section, and also has holdings in the lamp industry through Ekco-Ensign Electric Ltd., in which the majority holding is owned by Thorn Electrical Industries.

Safety Code for Building Contracts

APPOINTMENT of safety officers is required for building contracting firms by draft regulations under the Factories Acts published by the Ministry of Labour last week. The new regulations extend to the civil engineering industry much of the safety code already applying to the building industry and add new requirements, some with electrical significance.

Known as the Construction (General Provisions) Regulations, the new code affects building operations and works of engineering construction as defined in the Factories Acts. Any contractor who undertakes work to which the regulations will apply, and who normally employs a total force of 50 or more, will be required under the regulations to appoint one or more experienced persons as safety officer. Duties will include advising on safety matters and exercising general supervision over observance of safety regulations.

Electrical requirements written into the new code cover demolition precautions, overhead power lines and lighting. In connections with demolitions, the present Regulation 79(3) of the Building Regulations is largely repeated. This calls for all electric cables to be kept dead during demolition work.

Another regulation effectively re-enacted is that requiring "adequate and suitable" lighting for all working places and the approaches to them.

Recent years have seen much trouble with cranes striking overhead power lines which traverse building sites. A new regulation requires that "all practicable precautions shall be taken" to prevent danger from these lines "either by provision of adequate and suitably placed barriers or otherwise."

Additional requirements for fencing machines used on building sites and civil engineering sites are written into the draft regulations. All machines built after the regulations become law will have to have protection for specific parts, such as revolving shafts, gearing, flywheels, belt, pulley and chain drives.

Another set of draft regulations is the Construction (Lifting Operations) Regulations, which deal with the construction, use and examination of all lifting appliances, gear and tackle used in building and civil engineering operations.

Women urge H.P. safeguards

THE National Council of Women wants hire-purchase agreement forms to be left with the buyer for four days as a "cooling-off" period before the buyer signs. The annual conference at Scarborough carried by a large majority a resolution urging the Government to introduce legislation which would protect housewives from high-pressure salesmen. Other points in the resolution were that the forms should be in bold type throughout and show clearly the basic cash price and total interest, and that the buyer's signature be witnessed by a third party.

CAPITAL FOR NATIONALISED INDUSTRIES

CAPITAL investment by the CEGB and the area boards during 1960-1961 is put at £298·3 million in a White Paper on public investment published on Tuesday. Of this, area board investment amounts to £95·3 million. Corresponding figures for 1961-62 are £318·0 million and £103·4 million for area boards. For the South of Scotland EB capital spending is estimated at £26 million for 1960 and £24 million for 1961. Distribution expenditure in the two years being £8·8 and £9·0 million respectively. Corresponding figures for the N of S HEB are £12·4 million and £16 million, with £3·1 and £2·6 million to go on distribution projects. The CEGB and area board figures for 1960-61 are revisions upwards of totals earlier approved by the Minister.

STEEL PRICES UNCHANGED

THE Iron and Steel Board has decided not to make any general increase in steel prices as the result of the higher cost of coal and coke but, because of the increases in costs, further steel price reductions such as have been made during the past two years will be impossible, they state.

Further changes which may be made this year in iron and steel prices are likely to be limited to a few products only, or to details of price structure.

M.I. in Australia . . .

THE Metal Industries group is reorganising its Australian interests. The wholly owned subsidiary, Lancashire Dynamo Coates Ltd. of Melbourne, is being merged with Godfrey Electrical Industries Pty. of Sydney, and a new company is being formed to take over both firms. Metal Industries already owns half the Godfrey equity and a majority of its Preference capital, and has now purchased the remainder of both classes of shares. The new company will be known as M.I. Australia, with Mr W. McPherson (formerly commercial director Unilever of Australia) as chairman, and Mr D. J. Buckingham (formerly general sales manager of BICC (Australia) as general manager.

. . . and Petbow-Pye

A NEW Australian company with a capital of £250,000 has been formed jointly by Pye Industries Ltd., of Australia, and Petbow Ltd., of England. It will operate from premises at Huntingdale, Victoria, and the plant will gradually extend its operation to cover the whole Petbow range (engine-driven power plant, welding equipment, mobile workshops, switchboards, etc.), also the manufacture of "Magnicon" alternators under licence to the Macfarlane Engineering Co. Ltd.

NEW STEELWORKS FOR T.I.

A NEW integrated iron and steel works, estimated to cost nearly £60 million, to produce some 425,000 ingot tons of steel a year, is proposed by Tube Investments Ltd. for its subsidiaries, Park Gate Iron and Steel Co. The new development will be on a site adjacent to the latter's present works at Rotherham. The scheme provides for ore preparation and sinter plants to feed a blast furnace of 26½ ft hearth dia. The new steel-making plant will have two 75-ton Kaldo furnaces, fed by hot metal, and one 75-ton electric furnace, fed by scrap. The choice of the Kaldo type was influenced by the nature of the home ores to be used. Of Swedish origin, its vessel rotates and steel is produced speedily with the aid of oxygen.

Ingots will be rolled on a blooming mill, followed by a continuous billet mill. Finishing will include a 10 in. continuous rod and bar mill and a continuous narrow strip mill.

To feed the new blast furnace, supplies of ore will be increased from the company's own fields in Leicestershire, Northamptonshire and Lincolnshire.

Building is scheduled to begin next year, with capacity output achieved in 1964.

After the opening of English Electric Hse by Lady Nelson last week, Lord Nelson of Stafford, chairman, is seen showing the original 2LO radio transmitter to Lady Nelson

SCOTTISH HYDRO UNDER FIRE

TWO new guns have been levelled at the North of Scotland Hydro-Electric Board—the National Trust for Scotland have now asked for a reappraisal of the question of generation and distribution of electricity in the Highlands, and the newly formed Scottish Power Investigation Committee intend to press for a public inquiry into hydro-electric development plans.

The National Trust have asked the Secretary of State for Scotland to initiate immediate consultations between his departments and the Board. The Trust maintain that existing statutory arrangements governing the development of water power resources were arbitrary, outmoded and wholly unsatisfactory.

There were no means of obtaining a re-examination of a hydro-electric project until the Board published their scheme. Once it was published, there were only 40 days in which to consider the implications, and no objection could be made effectively unless it was pressed to the point of a public inquiry, they state.

"This is no way in which to treat hydro-electric development either as an element in an expanding Highland economy, in which it is indispensable, or as a factor in land use and the conservation of wild or semi-wild territory, which has increasing importance as a tourist attraction," the statement adds.

The Trust are prepared to carry objection to the Board's Nevis scheme to all legitimate lengths.

The other organisation—the Scottish Power Investigation Committee—who have Sir John C. Henderson as chairman, have among their objects:

(1) To secure the necessary provision of power for the Highlands by the most economic use of the country's natural resources of fuel, compatible with the interests of the consumers, taxpayers, tourist industry, public recreation and the conservation of amenities;

(2) to press for an independent public inquiry into plans for hydro-electric development in the Highlands;

(3) to draw attention to the dangers of proceeding with such development without an inquiry; and

(4) to oppose at public hearings any schemes by the electricity authorities which, in the view of the Council, are badly conceived in regard to economic, amenity and other considerations.

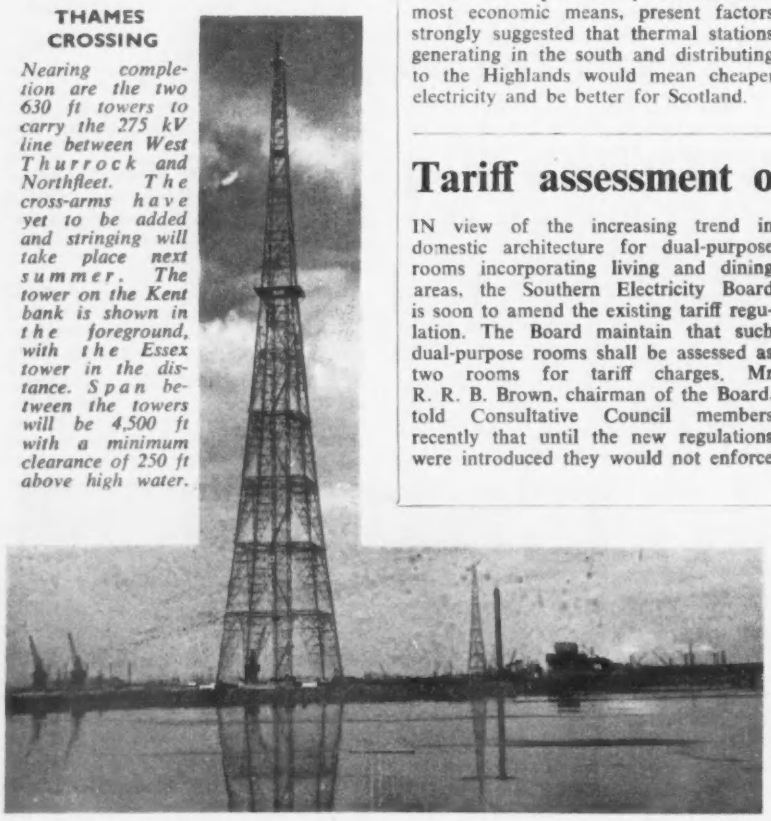
Outlining the Committee's views, Sir John stated that while they were anxious that electricity distribution in the Highlands should proceed by the best and most economic means, present factors strongly suggested that thermal stations generating in the south and distributing to the Highlands would mean cheaper electricity and be better for Scotland.

MARKING OF IMPORTS

PERMANENT magnets and a variety of hand tools are included in provisions of a new draft of the Merchandise Marks (Imported Goods) Order. This prohibits the importation into and the sale in the UK of such goods unless they bear an indication of origin. It stipulates that each article shall be die-stamped, etched or engraved with this indication, and the carton or container must also be stamped or printed.

This Draft Order was laid before Parliament on 25 Oct., where it has to lie for 40 days.

THAMES CROSSING



Nearing completion are the two 630 ft towers to carry the 275 kV line between West Thurrock and Northfleet. The cross-arms have yet to be added and stringing will take place next summer. The tower on the Kent bank is shown in the foreground, with the Essex tower in the distance. Span between the towers will be 4,500 ft with a minimum clearance of 250 ft above high water.

Coal's Future in Scottish Generation

THAT coal is expected to remain the backbone of power production in Scotland for the next decade is evident from papers presented at a Resources Symposium in Edinburgh this week. Although yield from the once prolific Lanarkshire and Ayrshire coalfields is dwindling, economic workings have been developed in the Lothians, Fife and Stirlingshire to supply base-load power stations such as Kincardine and a 1,200 MW station, projected for 1967-70, in the Lothians.

About one-third of Scotland's electricity comes from water-power, representing only a quarter of the country's hydro-electric potential, but further exploitation is at present uneconomic relative to other means of generation. Thus, if demand continues to increase at the current rate of 7% per annum, alternative means must be found to augment total supplies. Nuclear power in conjunction with pumped-storage is the most promising alternative; the 360 MW Hunterston station is a first step in this direction.

OFFICIAL PUBLICATIONS

Public Investment in Gt. Britain. Cmd. 1203. HMSO. 1s 9d (see page 695).

Draft of Merchandise Marks (Imported Goods) No. 1 Order, 1960. HMSO. 3d (see this page).

Rationalisation of Electric Power Consumption. UN Report. 2s 6d.

Construction (General Provisions) Draft Regulations (9d), and Construction (Lifting Operations) Draft Regulations. (1s). Both HMSO (see page 695).

Tariff assessment of dual-purpose rooms

IN view of the increasing trend in domestic architecture for dual-purpose rooms incorporating living and dining areas, the Southern Electricity Board is soon to amend the existing tariff regulation. The Board maintain that such dual-purpose rooms shall be assessed as two rooms for tariff charges. Mr R. R. B. Brown, chairman of the Board, told Consultative Council members recently that until the new regulations were introduced they would not enforce their interpretation in any dispute that might arise. He pointed out that when the regulation was drawn up over ten years ago it included a proviso that "rooms with structural divisions such as fixed or folded partitions count as two or more rooms, as the case may be." Since then a new feature had arisen and was not covered by the regulation.

One example was a room with a buttress on each of two opposite walls and a beam across the ceiling, with one end being used as a living room and the other as a dining room. In another extreme example of open planning there were no complete rooms as such, but the whole space was divided into compartments by half walls and other architectural features designed to give an illusion of separate rooms. He maintained that it would be quite inequitable for floor areas serving as two rooms and with appropriate electrical installations to be assessed other than as two rooms. The alternative was a total floor area assessment as opposed to numbers of habitable rooms, but this also aroused arguments, he said.

B.E.A.M.A. exhibits at Cologne Fair

BRITISH domestic appliances will again be displayed collectively at the International Household Goods and Hardware Fair at Cologne next year as part of the British Electrical and Allied Manufacturers' Association's export drive in the European market. Nine firms will be represented, they are: Berry's Electric, Corfield-Sigg, Dimplex, Radiation Ltd., EE, GEC, Heatrae, Simplex Electric Co. and Thorn Electrical Industries. No further applications to participate can be accepted, BEAMA says, as arrangements have been finalised. The Fair will be held from 24 to 27 Feb.

Mr S. F. Steward, director of BEAMA, said the Association was determined to make the exhibit at Cologne one of the spearheads of the continuing drive to do more business with Europe. BEAMA had urged the Government to help their export drive by creating stability in credit controls at home, which was so important in keeping unit costs down, Mr Steward added.

A recent survey by BEAMA estimates that £1,900 million will be spent on domestic electrical products by consumers in the Common Market countries from 1959 to 1963.

Instrument maker links with New York Co.

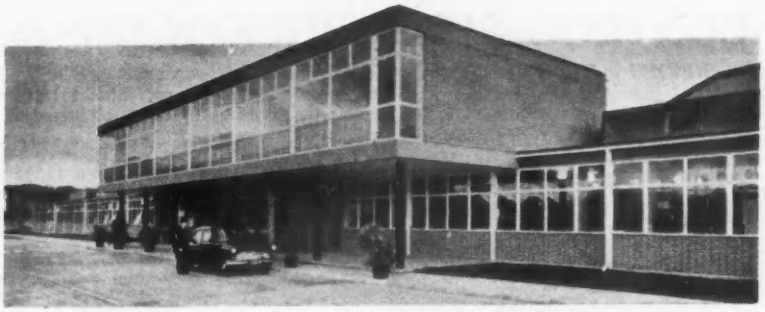
DRAYTON Regulator and Instrument Co. has formed a partnership with the New York hospital apparatus maker, Wilmot Castle Co., to make a wide range of hospital equipment, including operating tables and sterilisers. Manufacturing will be carried out by Drayton Castle Ltd. at new works in West Drayton.

Mobile switchgear showroom

SWITCHES and fusegear manufactured by Johnson and Phillips Ltd. will be shown during the first tour of a new mobile showroom commissioned by the company. The showroom takes the form of a 27 ft by 7 ft 6 in. trailer which will be towed by a Bedford eight-diesel prime mover to sites throughout the country. It will show J and P switchgear, transformers, capacitors and cables to parties of engineers from electricity boards, the NCB and the larger industrial companies. Incorporated in the trailer is an ample exhibition space, attractively panelled in sapele mahogany, together with reception accommodation and a small kitchen.

Exhibition at Sales Conference

AN exhibition of domestic appliances is to be staged in conjunction with the EDA Sales Conference at Harrogate from 28 Feb. to 3 March next. EDA are now inviting applications from manufacturers for space. The exhibition will normally be open for delegates only on the first three days, but will be open to the trade on the Friday.



Officially opened last Friday by Mr Peter Thorneycroft, Minister of Aviation, the new Applied Electronics Laboratory of the General Electric Co. Ltd. at Portsmouth, shown above, is one of a group of three operated by the company on behalf of the Ministry. It is engaged on research and development for defence purposes

ELECTRICAL DISPLAY AT MOSCOW FAIR

BRITAIN and Russia will exchange trade fairs next year. At Sokolniki Pk, Moscow, from 19 May to 4 June, Britain will stage the largest foreign exhibition ever to be held in the USSR. A big Soviet trade and industrial exhibition will be held at Earls Court from 7 July to 29 July and, at the same time, Russian cultural events will be staged in London theatres and concert halls.

The electrical industry will be well represented at Moscow. Of the 621 British firms participating, 48 are electrical engineering companies. English Electric will exhibit the various methods of generating electricity; the display will include a model of a nuclear power station and a new colour film, with Russian commentary, on the first 500 MW nuclear power station at Hinkley Point. Visitors to the AEI exhibit will see a mass spectrometer which enables impurities in materials to be detected down to one part in a thousand million; two of these spectrometers have just been ordered from AEI by Russia.

The British fair is being organised by Industrial and Trade Fairs Ltd. Mr J. B. Scott, a director of Crompton Parkinson and chairman of the Russian Section of the London Chamber of Commerce, has been appointed committee chairman of an advisory council set up to help the organisers. Mr G. H. Jolley, a director of AEI (Export) Ltd., is also on the committee. The two fairs are jointly sponsored by the Association of British Chambers of Commerce and the All-Union Chamber of Commerce of the USSR.

Sokolniki Pk, where the British Fair will occupy a 23-acre site, is comparable to London's Hyde Pk. The Soviet authorities estimate that one million Russians will pass through the turnstiles. In addition to using the two halls built by the Americans for their exhibition last year, the British will pay 25% of the cost of two more halls now being built by the Russians. As a gauge of size, 2,000 Britons will be going to Russia to stage the fair, compared with 80 Japanese at their exhibition in Moscow this year.

NEW OFFICES FOR N.W.E.B.

A £765,000 contract has been awarded to J. Gerrard and Sons, of Swinton, Lancs, by the North Western Electricity Board for the demolition of existing buildings in Dickinson St, Manchester, and the erection of a nine-storey office block, an entrance block and a new substation. The project is due to be completed in October, 1962.

NEED FOR CONCESSIONS IN EUROPE

BRITAIN was not prepared to pay any price for a *rapprochement* between the Six and the Seven, but bridging the gap was bound to call for considerable concessions on both sides, Mr Reginald Maudling, President of the Board of Trade, said last week. Addressing the annual conference of the Institute of Directors, he said a unified Europe was of fundamental importance to the British economy. Unfortunately, the suggestion was not true that Britain only had to make up her mind and the barrier would be down. The simple fact was that until recently the Six had not been willing to negotiate. Now both sides were seeking a basis for negotiation, and that in itself was encouraging, he said.

The Chancellor of the Exchequer, Mr Selwyn Lloyd, told the Conference that the reduction in Bank rate to 5½% did not mean a change in the policy of credit restriction, but simply a realignment with rates overseas. Restraint was still needed and Bank rate, bank advances, and restrictions on credit and hire-purchase were the right weapons to do the job, he said. Recent appeals for stable hire-purchase conditions have apparently not influenced Government thinking yet.

CONTROL CUTS CHICKEN COSTS

HIGHLIGHT of EDA's stand at this year's Dairy Show at Olympia was, undoubtedly, electrical broiler-house control. Modern controlled-environment poultry-rearing methods can, we are told, produce an economically priced bird, plump for the supermarket, in from three to six months. This scientific mass-production process centres round the broiler-house, a thermally insulated wooden structure. Here, incubator-hatched chicks, after a period under an infra-red "brooder," begin a nether-world existence. As potential broilers they will be subjected to light cycles of varying colour and intensity, in even-temperature surroundings, and forced-fed at regular intervals on a carefully prepared diet.

The process is complicated in practice by temperature, food and light cycling times having to be related to the stage of growth of stock. Ventilation, too, is important and must at all times be adequate. Feature of the EDA exhibit was a self-contained unit by means of which these variables can be controlled. Available for about £150, the unit can be set for either manual or automatic control. Temperature control and ventilation are effected simultaneously by extraction fans. The unit keeps temperatures within specified thermostatic limits, maintaining sufficient ventilation in winter months and enough cool air in summer, by fan cycling. Should extreme weather conditions cause uncontrollable temperature fluctuations, an overriding thermostat operates an alarm. Light cycling is somewhat arbitrary, depending a good deal on individual opinion, so provision is made on the control unit for switching a variety of timed sequences of red, blue and white light. Feeding-stuff distribution in the broiler-house is by mechanical conveyer which, of course, lends itself to control by the unit.

E.R.A. new work

WORK recently started by the ERA includes four surge phenomena subjects and two heating topics, according to the recently published October number of *Co-operative Electrical Research*. The subjects are:

Investigation of cause of flashover on 120 MVA auto-transformer at Uskmouth for South Wales Division.

Study of the causes of damage to telecommunication cable and measurement of impulse breakdown voltage.

Investigation of suspected surge voltages in a circuit for testing supply meters.

Impulse tests on sample stator coils in conjuction with corresponding a.c. tests in the Materials Department.

Use of a network analyser to study thermal storage phenomena in suspended floors.

The effect of a very high degree of thermal insulation below cable level on the performance of floor-heating systems in flats in London.

Also in the October issue are articles on the rating of high-power circuit-breakers, and on ERA and CISPR activities in the field of radio interference.

S.T.C. puts sound in Lagos Parliament

AN elaborate sound system has just been installed at Lagos by Standard Telephones and Cables in the new National Hall, meeting place of newly independent Nigeria's Legislative Assembly. Apart from amplification through 150 loudspeakers concealed in the back of alternate seats, the system provides for simultaneous translation into six languages and the recording of proceedings on tape machines. Sixteen microphones are suspended over the assembly and Mr Speaker and the clerks have their own microphones and a local loudspeaker. Microphones in various areas can be faded out from a control panel and the Speaker also has a button to fade out other microphones when he wishes to be heard.

Orders at high level

ORDERS on hand of the engineering and electrical goods industries at the end of August were at the highest level for the past three years. Home and export orders were both about 20% higher than a year earlier. Production in July and August was higher than last year, but with the holiday season curbing output, delivery dates lengthened considerably.

Electrical engineering output eased slightly in June, the Board of Trade estimates. For the second quarter, production was about 5% below the first quarter of this year and 11% short of the record level reached at the end of 1959.

GOVERNMENTS' CAUSE HIGH PRICES

THE knotty problem of commodity price stabilisation has been looked into by the Purchasing Officers' Association. After a 15-month investigation, a research committee has come to the conclusion that any successful scheme must remove the causes of price fluctuations, rather than attempt to control the price. The committee puts much of the blame for erratic prices on the policies of Governments. The tariffs and quotas against lead and zinc imposed by the US are an extreme example of a Government upsetting prices, says the report. Dumping, stockpiling and subsidisation by various Governments have also been major unsettling factors, often with harmful effects on the economies of producer countries.

CITRINE ON MANAGEMENT

EXPERIENCE with the electricity supply industry, as well as in other sections of industry, was drawn on by Lord Citrine when he spoke last week in a House of Lords debate on responsibilities of management. Lord Citrine suggested that "public accountability," a phrase commonly applied to nationalised industry, would more and more emerge as a relevant factor in considering the problems of private industry.

He expressed his belief that management could be taught as a subject, provided some natural aptitude was present. However, ability to handle people was becoming even more important than technical qualifications.

Lord Citrine said experience had shown him that managements given the right type of lead would follow without much trouble. In carrying out the principles and purposes of the Electricity Acts, he had never discerned, in any organisation with which he was connected, anything in the form of organised opposition by management.

There had been misunderstanding and hesitation, but nothing more. These difficulties had disappeared when matters had been fully explained. Early experience with nationalisation of electricity supply had convinced him that it was necessary to personalise management—it was not possible to work on a basis of anonymous titles.

In another part of his speech, Lord Citrine said he was sure there was greater reluctance on the part of the British people to adopt new ideas than there was on the part of most residents of other countries.

Aiding flood victims in Somerset, AEI-Hotpoint participated in an emergency washing centre at the SWEB's showrooms at Taunton. The clothes were also dried and ironed on the spot. AEI-Hotpoint also sent a battery of washing/spin drying machines to Exeter for a similar scheme there

Ministry to reconsider Euston-Crewe electrification

BRITISH RAILWAYS' modernisation plan for the main line from Euston to Crewe, based on 50 c/s electrification, is to be reconsidered at Ministry of Transport level. Meanwhile, no new contracts for the scheme are to be placed, although the MoT, Mr E. Marples, says there is no question of cancellation of existing contracts and work under them has continued.

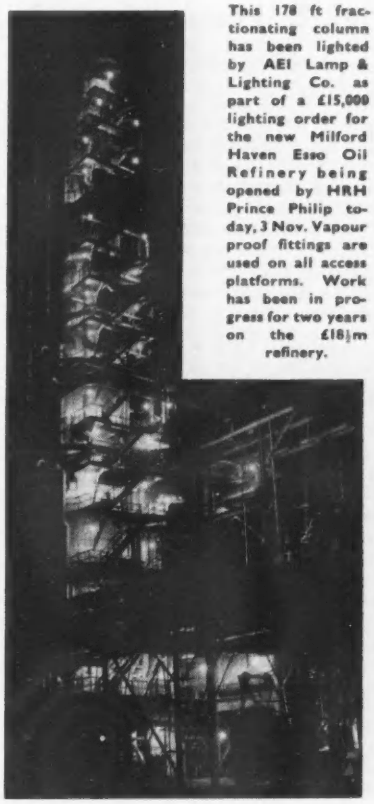
The renewed look at the London-Midland electrification scheme was announced during a debate on the railways in the House of Commons last week which took account of the recent report of the Select Committee on Nationalised Industries on the subject (ELECTRICAL TIMES, 28 July). That report criticised the methods of estimating employed by British Railways but suggested that the London-Midland scheme ought to be carried through now that it has gone so far.

Latest estimate for the cost of London-Midland modernisation (which includes much work only incidental to electrification) is £160 million. The Parliamentary Secretary, MoT, pointed out in the debate that this was eight times the cost of the M1. "We have to decide in the long run whether to go in for the London-Midland electrification scheme, or use some of the money on other forms of transport."

The BTC has carried out a reassessment of the electrification scheme in the light of its experience elsewhere and this is under "urgent examination" by the Ministry.

During the debate in general there was evidence of concern about whether it would be possible to make the railways self-supporting in anything like their present form. But Mr Marples rejected forthrightly all suggestions that it would be possible to do without a railways system in the UK. On the other hand, he pointed out that gross takings/man/year in British Railways were only about £880. He announced that he had set up what he called a "compact study group" under his own chairmanship which is preparing a revised modernisation plan. The BTC was represented on this group. He promised a White Paper setting out the Government's proposals.

Sir Toby Low, who was chairman of the Select Committee whose report was much referred to in the debate, said that now the London-Midland electrification scheme had gone so far it should be completed as soon as possible. Mr A. Albu, a professional engineer by training, spoke of "magnificent achievements made in a very short time by very small staffs in electrification." He said British Railways and the electrical manufacturers, in organising the recent conference and exhibition, had done much to help exports. He understood that six countries had already adopted the 25 kV 50 c/s standard and more were likely to do so. However, he called for a big increase in the professional engineering staffs of the railways.



This 178 ft fractionating column has been lighted by AEI Lamp & Lighting Co. as part of a £15,000 lighting order for the new Milford Haven Esso Oil Refinery being opened by HRH Prince Philip today, 3 Nov. Vapour proof fittings are used on all access platforms. Work has been in progress for two years on the £18½m refinery.

£5½m ORDER FROM BRITISH RAILWAYS

A FURTHER £5½ million worth of diesel locomotives and shunting equipment has been ordered by the British Transport Commission. The contracts cover 50 1,700 h.p. main-line diesel locomotives with hydraulic transmission and 98 350 h.p. engines with electric transmission for diesel shunting locomotives. The main-line diesels are all for Western Region as part of the programme to replace steam. Forty-one of the shunters, which are being built in BR workshops, are for Western Region and 40 for London Midland Region.

Oldham's annual dinner

GOOD prospects for the battery industry despite a down turn in the motor trade were emphasised by Mr John Oldham, O.B.E., at his company's thirty-first motor show dinner held at the Connaught Rooms last week. Over 450 guests heard Mr Oldham call for a revision of the tax system and a more realistic attitude to exports by the Government. Mr Edward C. Oldham replied to the toast of "Our Hosts," proposed by Mr R. E. Allison. The evening concluded with a cabaret presented by David Berglas, Dickie Henderson and others.

GROWTH OF FIXED PRICE TENDERING

THE two main problems now affecting electrical contractors were, first, the acute shortage of electricians and, second, the insidious growth of fixed-price tenders under conditions where the forecasting of costs for years ahead made tendering of work a huge gamble in which the cards were stacked against the contractor, stated Mr J. Y. Dick, president of the Electrical Contractors' Association of Scotland, speaking at the Association's diamond jubilee dinner last week.

Looking at labour relationship, he said that by and large Scottish conditions were sound. The growth of the unions had forced a parallel growth in the employers' organisations. The activities of the latter had been curbed to some extent by the Restrictive Trade Practices Act. There were many who believed that some similar curb on unions was overdue.

On the current phase of mergers and takeovers, he thought the changes were disquieting despite the assurances of the courteous circulars to the contrary. He believed the natural buoyancy of the industry would not be impaired and that new patterns would emerge to provide a stimulation for the whole industry.

Electronics consortium

A CONSORTIUM of five British electronics manufacturing companies has been formed on the recommendation of the Ministry of Aviation to exploit the overseas and British markets for a major air-to-ground multi-channel telemetry system developed by the member companies in collaboration with the Royal Aircraft Establishment, Farnborough. The manufacturers participating in the consortium are Elliott Brothers (London), McMichael Radio, Rank Cintel, Southern Instruments (Contracts), and W.S. Electronics.

RADIO SHOW, 1961

NEXT year's National Radio and Television Exhibition will be held at Earls Court from 23 Aug. to 2 Sept. A preview for special visitors will be held a day before the opening. The show will mark the silver jubilee of television programmes, first seen at "Radiolympia" in 1936.

E.D.A. speaking contest

ENTRIES will close on 1 Dec. for the 1961 EDA Public Speaking Competition. Competitors, who must be employees of the electricity supply industry and under 35 years of age, may speak on "Modern Trends in Kitchen Planning," "Hobbies," "Some Lesser-known Uses of Electricity," "Keeping Warm," or their own subject provided it is connected with the use of electricity. Electricity boards will begin their area competitions early in the new year and the finals will be held in London in May.

U.N. Plans Thermal Station Study

STUDY of several aspects of thermal power station design and construction has been approved by the UN Economic Commission for Europe's Committee on Electric Power. At a meeting in Geneva last month, a group of experts was set up to investigate burning of fuels of low volatile content, use of waste combustion products from power stations, corrosion of air heater surfaces when oil is fired, and general trends in station design.

Also agreed was a meeting in Warsaw, Poland, in the spring of 1962 to consider a symposium of reports on "rational consumption of electric power," by which is meant increase in thermal and economic efficiency, including steps to improve load factor and power factor. The committee had before it at its meeting statistics suggesting a high level of rate of increase in electrical energy consumption in Europe at the beginning of the year.

Semiconductor Research

RESEARCH into the plastics deformation of semiconductor materials, germanium and indium antimonide, is being carried out at the Royal School of Mines, Imperial College, in an attempt to learn more about the effect on electrical qualities of geometrical defects in the crystal lattice and of chemical impurities in such extremely pure materials. Notes on this work are included in the school's research report for 1957-60, recently published. Amongst other work discussed is experimental investigation of electro-magnetic prospecting for metallic ore bodies, which is being used increasingly.

Sayings OF THE WEEK

"Let us bury the idea that retailing is simple and let the electrical trades be pioneers in making retailing a highly skilled occupation." . . . N. A. H. STACEY (of GEC), at the annual dinner of South Staffs branch of Electrical Contractors' Association.

"I have no hesitation whatever in saying . . . that there is a greater reluctance on the part of British people to adopt new ideas than there is on the part of most residents of other countries." . . . LORD CITRINE, speaking in a House of Lords debate on responsibilities of management.

"Teachers should not only refrain from appearing to be omniscient, but should even lead those whom they are responsible for into the realm of the unanswered questions." . . . SIR CYRIL HINSHELWOOD, at Imperial College Commemorative Day.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, November 1

	£ per ton	Weekly change £
COPPER, standard class A (settlement)	220½	+¼
" (3 months)	222¼	+¼
LEAD, refined pig, 99·97% purity (cash)	68½	+½
" (3 months)	69½	+½
TIN, refined, min. 99·75% purity (settlement)	796½	−4½
" (3 months)	796	—
ALUMINIUM, ingots 99·99·5%	186	—
" wire bars (4×4×54")	193½	—
BRASS Strip 63/37	197½	—
SILVER (Troy oz)	79½d	—
ZINC, virgin, min. 98% purity (cash)	88½	−¼
" (3 months)	86¼	—
RUBBER, per lb		
No. 1, RSS, spot	26½d	−1⅛d
c.i.f. basis, ports, Jan.	26½d	−1⅛d
ARMOURING:		
Galv. Steel Wire (0·104 in.)	66½	—
Mild Steel Tape (0·04 × 1½ in.)	53*	—
NICKEL (home)	600	—
MERCURY (76 lb flask)	70½	—
AMERICAN PRICES:		
Copper, electrolytic (per lb)	30c	—
Lead, (New York)	12c	—

* *Tape Price, now an average, includes varnishing*

Fuel in Birmingham's Redevelopment

THE present redevelopment of Birmingham City, referred to by Ald John H. Lewis, O.B.E., J.P., deputy mayor of Birmingham, as the greatest redevelopment plan in the world, was the main subject of speeches at the Birmingham Electric Club annual dinner recently. The club members' contribution to the city's prosperity was also referred to by Mr J. R. Anderson, president. Birmingham continued to grow in stature, he said, and it was doubtful if the redevelopment in the city centre, whether it be in roads or buildings, could be matched anywhere in the world.

It may well be, though, that long before the new buildings reached their "half-life" it would be found that the liquid fuel they were using would be the most expensive form of heating because figures showed that during the past two decades, despite outside influences, the increases in the average price of electricity had been far less than those of competing fuels, and this trend was likely to continue. The large buildings under construction in the city centre would make demands on the electricity supply system as great as many large industrial consumers.

Mr A. R. Leith, senior vice-president of the Club, proposed the toast to the guests, and the response was made by Sir Robertson King, K.B.E., chairman of the Electricity Council.

Survey of Transducers

A LIST of available types of transducers, both current type and those under development, is being compiled by the Analogue Data Processing Technical Committee of the Electronic Engineering Association. The Committee is seeking the help of manufacturers or users outside the membership of the Association, who will be given the full results of the survey. A questionnaire indicating the information required is obtainable from the Association at 11 Green St, W.1.

PARSONS CHIEF'S LIFE

THE life of Sir Claude Gibb, chairman and managing director of C. A. Parsons and Co. Ltd., until his death in January, will be the subject of this year's Parsons Memorial Lecture. The talk will be delivered by Dr A. T. Bowden, chief research engineer for C. A. Parsons and a director of Nuclear Power Plant Co. Ltd., at Newcastle upon Tyne on 4 Nov.

Sailing round the world

SPEAKER at the October luncheon of the Batti-Wallahs' Society was Major H. W. Tilman, who held the close interest of members and guests with an account of long distance sailing in small craft. The next luncheon of the Society is to be held on Wednesday, 30 Nov., when the speaker will be Mr K. Beken, marine artist.

News in Brief

"Electronics at Work" is to be the subject of the concluding lectures commemorating the twenty-fifth anniversary of Ultra Electric Ltd., which is to be held at a special session for schoolchildren in the Royal Festival Hall, today, 3 Nov., at 2.30 p.m.

Brook Motors Ltd. have produced a new 16-mm colour sound film of the story of a Yorkshire river, including manufacturing sequences at several factories. It is available on free loan.

Tube Investments' Electrical Division recently held a five-day sales conference at the Grand Hotel, Folkestone.

The Heavy Plant Division of AEI Ltd. have received manufacturing instructions for mine-winders worth over £230,000 from the National Coal Board and the Union Corporation of South Africa.

Berry's Electric Ltd. have evolved a new demonstration stand for their "Magicmaid" food mixers which are to be featured in a TV campaign starting 4 Nov.

Eastern Electricity Board plan to open a new service centre in High St, Wisbech.

Company Activities

IT must be a long time since a Bank Rate change has met with so little concern, almost disregard, as did last week's cut from 6% to 5½%. The stock market barely murmured its recognition of the event. It had taken it for granted following the speech made by the Governor of the Bank of England at the previous week's bankers' dinner. That gave a hint, bordering practically on disclosure, that a reduction was imperative in order to iron out some of the distortions that had been built up in international interest rates, and distortions which were aggravating the United States balance of payments deficit, creating distrust of the dollar and stimulating the great "gold rush" which has so recently made national headlines.

But here at home, the "squeeze" goes on. Mr Selwyn Lloyd, despite the falls in sales of domestic appliances, lower home and overseas sales of motor cars, is quite adamant about that. Only three hours after the cut had been made known he was telling the annual conference of the Institute of Directors: "Some of you may have been wondering whether this is the first sign of a change in our policy of restraint, of credit restriction. It is nothing of the kind." To John and Jane Citizen all this must seem a little puzzling, if not somewhat contradictory. But the key to the riddle is that the UK and other European governments are now choosing the lesser of two evils. This amounts to risking a premature loosening of money rates, which the states of their domestic economies do not yet warrant, thereby hoping to stem the run on the dollar and prevent an otherwise deterioration in international trade which would result from the US authorities taking drastic defensive action.

In the City it all added up to no more than a mere 0·2 rise in the *Financial Times* industrial ordinary index to 321·1. It will also be seen from my table alongside that electrical shares, too, showed scarcely any response.

One outstanding feature of the week, however, has been the rise in the £1 ordinary shares of AEI. There has been a steady stream of investment buying here after they touched a new "low" of 42s 3d in the previous week.

The fall from 63s 10½d to 63s 4½d in the £1 Ordinary shares of J. Lucas can in part be attributed to the trade returns which show that UK exports of passenger cars in September were at their lowest level since February, 1957. On further consideration of Plessey's bid terms for Garrard Engineering, the former's shares dropped from 52s to 50s 6d.

ELECTRICAL SHARE MOVEMENTS EITHER SIDE OF BANK RATE CHANGE
(Middle prices at close of day's business)

SHARE	24 Oct.	26 Oct.	27 Oct. Bank Rate Cut to 5½%	28 Oct.
AEI £1 ...	42/9	46/-	47/-	47/9
BSR 5/- ...	50/7½	49/3	49/6	50/-
E. K. Cole 5/- ...	27/1½	27/6	27/3	27/6*
Decca 10/- ...	48/9	49/-	48/10½	48/6
EMI 10/- ...	43/9	44/6	45/-	44/3
Elliott-Auto 5/-	27/3	26/10½	26/10½	26/10½
English Elect. £1	34/-	35/-	35/6	35/6
GEC £1 ...	35/-	35/-	35/6	35/-
Hoover "A" 5/-	43/3	43/10½	43/7½	43/1½
J. Lucas £1 ...	63/10½	63/1½	63/1½	63/4½
Murphy Radio 5/-	16/1½	15/10½	15/10½	15/9
Parsons £1 ...	45/9	47/-	47/-	46/6
Philips fl.10 ...	11½	11½	11 7/16	11 7/16
Plessey 10/- ...	52/-	52/-	50/9	50/6
Garrard 1/- ...	3/7½	3/6	3/4½	3/6
Pye 5/-	16/6	15/10½	15/10½	15/6
Thorn 5/- ...	49/3	49/3	49/3	48/3
Vactric 5/- ...	6/1½	6/1½	6/1½	3/9

* 22/3 in after-hours dealings following announcement of Pye-E. K. Cole merger.

One of the few items of company news was contributed by Crompton Parkinson, who are also participating members of Atomic Power Constructions. There was nothing "atomic" about the results, however, with the group profits before tax for the year ended 30 June, 1960, at £2,750,617 against £2,755,691 previously, and the increase in the dividend from the equivalent of 11·2% to 12½% made little impression on the price of the 5s Ordinary shares at 11s 1½d.—*From our City Correspondent.*

British Aluminium Co. Ltd.

Sales in 1959-60 were a record, but increasing competition will make keen selling and marketing necessary if progress is to be continued, Lord Plowden, the chairman, warns. Confident that the demand for aluminium, particularly in the UK, will increase substantially during the next five years, the company has taken steps to expand supplies. Arrangements for the integration of the manufacturing facilities of the company and of Reynolds TI Aluminium have been completed, and since 1 Aug., the start of the current year, the facilities of the two companies have been operating as virtually one group. It is anticipated that in the relatively near future the assets of Reynolds TI Aluminium will be merged formally into British Aluminium Co.

Contactor Switchgear Ltd.

Although the profit for the 12 months ended 31 July last declined slightly to £124,170 (*£146,265*), a final dividend of 10% maintains the total distribution at 14%. Taxation charge is £65,961 (*£67,364*).

Crompton Parkinson Ltd.

Although the group profit for the year to 30 June last declined slightly to £2,750,617, against the previous year's total of £2,755,691, dividend is raised from the equivalent of 11⅛% to 12½%, with a final of 7½%. Taxation absorbs £1,474,550 (*£1,438,054*), leaving a consolidated net income of £1,276,067 (*£1,317,637*).

Dowding and Mills

Profit for the year ended 30 June last, before tax, is £149,366 (*£141,398*), and a final dividend of 3d per 1s share again makes the total distribution 4½d.

Hailwood Industries Ltd.

Dividend for the year to 30 June last of this lighting glassware firm is 15%, and the directors forecast at least maintenance of that rate for 1960-61 on capital increased by a one-for-two scrip issue. Group profit is £179,817 (*£102,985*), and after taxation, etc., net profit amounts to £95,093 (*£54,221*). In maintaining the 15% dividend, the directors state that they have been influenced by the substantial programme of expansion they have now approved, which will involve considerable expenditure.

Laurence Scott and Electromotors

Announcing a maintained interim dividend of 3d per 5s share for 1960, the directors again point out that competitive conditions have become increasingly severe and, moreover, that production has been adversely affected by certain contracts undertaken during the period of order scarcity. As a result, the profit level for the current year is likely to show a decrease on previous years. Nevertheless, it is expected that the previous year's final of 6d per share will be maintained. The volume of incoming orders received during 1960 is considered satisfactory, in view of prevailing trading conditions.

Longmore Brothers Ltd.

With profit increasing to £256,048 for the year to 4 Aug. last, the dividend is raised a further 5% to 30% for this conduit and tube firm. Profit for the previous year was £170,834 before tax. After taxation charge, the net profit becomes £127,548 (*£87,434*).

L. Sterne and Co. Ltd.

The redundancy news no doubt contributed to the poor result of this concern's "rights" issue of 762,528 Ordinary 5s shares. Only about 66% (502,995) of the shares were applied for.

Waite and Son

This lampshade firm has had a healthy increase in sales for the first nine months of 1960 compared with the previous year, and the chairman estimates that profits, before tax, for the year should be at least £50,000—sufficient to absorb the present debit balance on profit and loss account and enable the resumption of dividend payments.

Intended Dividends

Anglo-Portuguese Telegraph Co. Interim 3% (*same*).

Atlas Electric and General Trust. Interim 3% (*against equivalent of 2%*).

Bulpitts (Swan Brand). Interim 5% (*same*).

Edwards High Vacuum Ltd. Interim 5% (*against equivalent of 4%*).

Power Investment Corpn. Interim 4% (*same*).

Pressed Steel Co. Interim 9% (*same*), but on larger capital.

Stone-Platt Industries. Interim 4½% (*4%*).

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

3 Nov.—Newcastle upon Tyne C.C. (1) Electrical installation in further extensions and alterations at Heaton Grammar and High Schools.—See 27 Oct. issue.

3 Nov.—Sunderland B.C. Supply of gas and electric cooking equipment for Bede Grammar School.—See 27 Oct. issue.

4 Nov.—Bristol C.C. Electrical installation, on fixed-price basis, at new Redland Trng College, Redland Hill. Applications, by contractors on N.I.C.E.I.C. roll, for re-advertised tender, to City Architect, Council Hse, by above date.

4 Nov.—Down C.C. All-electric lighting and heating installation in Child Health and Welfare Clinic, Knocknee Ave, Kilkeel.—See 13 Oct. issue.

4 Nov.—Dunbarton C.C. Supply of Group "B" tubular steel columns.—See 27 Oct. issue.

4 Nov.—Oldbury B.C. Erection, on fixed-price basis, of 88 Class "B" concrete columns, supply and fitting of post-top lanterns with lamps/control gear/time switches, plus resiting of 26 units and conversion to MBF/U operation along various roads.—See 20 Oct. issue.

4 Nov.—Stornoway B.C. Electrical work in erection of ten houses, Keith and Newton streets. Applications to architects: Gratton and McLean, 21 Woodside Terr, Glasgow, by above date.

5 Nov.—East Anglian Hospital Board. Applications for inclusion in list of approved contractors to Board's Engineer, Block "B," Government Bldgs, Brooklands Ave, Cambridge, by above date.—Advertised 27 Oct. issue.

5 Nov.—Longbenton U.D.C. Supply and erection of 64 sodium units and 474 post-top lantern filament Group II street lighting units.—See 20 Oct. issue.

5 Nov.—New Windsor B.C. Supply of (Item 15) lamps and (Item 21) fittings and cable for year to 31 Dec., 1961.—See 6 Oct. issue.

7 Nov.—Aldershot B.C. Supply and erection of Group "A" 25 ft steel columns with 140 W sodium lighting along Lower Farnham Rd and Group "B" 15 ft steel columns and 60 W sodium lighting along Church La West/Ayling Hill.—See 27 Oct. issue.

7 Nov.—Baildon U.D.C. Electrical work in 30 houses at The Grove. Housing Manager, Town Hall.

7 Nov.—Belfast C.C. Electrical work in alterations and renovation at Falls Rd Public Baths.—See 27 Oct. issue.

7 Nov.—Bristol C.C. (b) Electrical installation, on fixed-price basis, in primary school at Withywood. Applications to City Architect, Council Hse, by above date.

7 Nov.—East Suffolk C.C. Street lighting included in Contract No. 36 for making up of 247 yd private road.—See 27 Oct. issue.

7 Nov.—Edinburgh (2) Electrical services renewal in Ward 4 alterations at Northern General Hospital. Applications to consulting engineers: Hulley and Kirkwood, 5 Lynedoch St, Glasgow C3, by above date.

7 Nov.—Manchester C.C. Contract 323. Electrical installations: 12 flats, two shops and ten garages, Greenwood Rd.—Advertised 27 Oct. issue.

7 Nov.—Swanage U.D.C. Electrical installation in new depot at King's Rd West.—See 20 Oct. issue.

8 Nov.—Flintshire C.C. Electrical installations on smallholdings: (a) Wood Farm; (b) Talwrn Scheme (3 holdings); (c) Shordley all at Kinnerton. County Land Agent, Maysmor W. Jones, 16 Wrexham St, Mold. Deposit £1 1s.

8 Nov.—N.I. Hospitals Authority. Supply of two heated food conveyors. Purchasing Officer, Belfast Hospital Management Committee, Broadway.

9 Nov.—Cheadle and Gatley U.D.C. Supply and erection of 30 Group "A" pre-stressed concrete columns with 400 W mercury vapour lanterns in Bird Hall La.—See 27 Oct. issue.

9 Nov.—Chelmsford B.C. (c) Electrical installation in new livestock market, Victoria Rd.—See 27 Oct. issue.

9 Nov.—Durham C.C. Electrical installations in standard police houses at Darlington Rd, West Auckland and Low Grange Ave, Billingham. Applications to County Architect, South St, Durham, by above date.

9 Nov.—Edinburgh. (2) Electrical works in conversions to form ante-natal clinic at Eastern General Hospital, Edinburgh 6. Applications to Ian Hunter and Ptnrs, 46 Palmerston Pl, Edinburgh 12.

10 Nov.—Derby B.C. Supply of 49 200 W sodium discharge units on 35 ft steel columns for A5111 Raynesway Trunk Rd lighting.—Advertised 27 Oct. issue.

10 Nov.—Northwich R.D.C. Supply and installation of 40 Group "A" concrete columns with sodium lamps/lanterns/gear.—See 20 Oct. issue.

10 Nov.—Suffolk and Ipswich Fire Authority. Electrical work at Colchester Rd Fire Station.—Advertised 27 Oct. issue.

10 Nov.—Sunderland B.C. Electrical installation in sports pavilion, Marley Pots. Borough Architect, Grange Hse, Stockton Rd.

11 Nov.—Essex C.C. Supply and erection of 11 35 ft tubular steel columns with 200 W linear sodium lamps/gear on A11 roundabout at Stump Cross. County Surveyor, Highways Dept., Old Court, Chelmsford.

11 Nov.—Horsham U.D.C. Supply and erection of 26 Stanton Group "B" concrete columns and G.E.C. post-top lanterns for Hawkesbourne Rd and Redkiln Way lighting. Applications to Council Surveyor, Council Offices, Horsham Pk, by above date.

11 Nov.—New Windsor. Electrical installations in two maisonnettes at Clewer New Town.—See 13 Oct. issue.

11 Nov.—Oldbury B.C. Erection, on fixed-price basis, of 20 Class "B" concrete columns, supply and fitting of post-top lanterns/lamps, control gear/time switches on Lion Farm estate.—See 20 Oct. issue.

11 Nov.—Wrexham B.C. Supply and erecton, on fixed-price basis, of ten 25 ft fluted steel columns/brackets and 140 W sodium vapour lanterns/lamps for A483 (part) lighting.—Advertised 27 Oct. issue.

14 Nov.—Malvern U.D.C. Erection of 151 concrete columns and lanterns plus provision of wiring/lamps on seven new estates together with the removal of four gas lighting columns.—See 27 Oct. issue.

14 Nov.—N.A.T.O. Infrastructure. Provision and proving of a very low-frequency radio-telegraph transmitting station in North of England.—Advertised 13 Oct. issue.

14 Nov.—West Riding C.C. Changeover from d.c. to a.c., by contractors on N.I.C.E.I.C. roll, at Beech Towers, Staincliffe, Dewsbury.—See 27 Oct. issue.

15 Nov.—Rayleigh U.D.C. Supply and erection of 14 Group "A" concrete columns and 28 sodium lamps/gear for A127 Southend Arterial Rd lighting. Engineer and Surveyor, Council Offices.

15 Nov.—Whaley Bridge U.D.C. Supply and erection complete of 16 Class "A" concrete columns with sodium lighting.—See 27 Oct. issue.

16 Nov.—Ipswich B.C. Electrical installation in proposed 56-person aged people's home, Chantry estate.—See 20 Oct. issue.

16 Nov.—Wigan B.C. Electrical installations in 27 dwellings on Drummond Sq site. Borough Engineer, Hewlett St. Deposit £1 1s.

17 Nov.—Belfast C.C. Electrical installation in Assembly Hall, Dunkeld Gdns Model Secondary School for Girls.—See 27 Oct. issue.

17 Nov.—Birmingham C.C. Socket-outlet installations and lighting installation repairs in 250 houses at Acock's Green.—See 20 Oct. issue.

17 Nov.—Darfield U.D.C. Rewiring of 118 houses. Surveyor and Public Health Inspector, Council Offices, Darfield, near Barnsley.

17 Nov.—Fylde Water Board. Supply of flow recorder panel and hydraulic measuring equipment.—Advertised 13 Oct. issue.

17 Nov.—Glasgow T.C. Supply of heavy canteen equipment for school kitchens including: (Item 7) fish fryer; (8) refrigerators; (9) food preparing machine; (10) hot cupboard; (11) potato peeling machine; (12) mixing machine; (13) meat slicer. City Architect, Education Section, 20 Trongate, Glasgow C.1.

18 Nov.—Hornchurch U.D.C. Class "A" lighting for Trunk Rd A13; resiting of 30 steel units and erection of 34 steel units; (2) supply of 34 steel columns; (3) supply of 83 lanterns; (4) supply of 83 sets control gear; (5) supply of 83 horizontal 400 W MBF/U lamps. Engineer and Surveyor, Council Offices, Billet La. Deposit £2 2s.

19 Nov.—Flintshire C.C. Compressor for charging B.A. cylinders. Chief Fire Officer, Coast Rd, Rhyl.

21 Nov.—Morpeth R.D.C. Electrical installations in 18 houses, Mitford. Engineer and

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 108 queries answered this week

"Lectross" towel and clothes dryers—address for spares? M.A.N.W.E.B.—Electronic Precision Equipment Ltd., 46 Windmill Hill, Ruislip, Middx.

"Behr" convector heaters—agents for? E.E.—Joseph Lang and Co., 148 Fleet Rd, N.W.3.

"Vogue" washing machines—agents for? S.W.E.B.—Metalcraft Mnfg. Co. (Canada) Ltd., 37 Berners St, W.1.

"Twinnyvac" vacuum cleaners—agents for? L.E.B.—F. Horn, 55 Park La, W.1.

"Mastermatic" vending machines—makers of? V.C.—The Master Vending Machine Co. Ltd., 175 High St, Deritend, Birmingham 12.

"Veto" fluorescent lamps—agents for? R.B.—Deta (Overseas) Co. Ltd., 31 Moscow Rd, Caroline Pl, W.2.

"Rota-Plan" light diffuser—makers of? J.T.C.—Rotaflex (G.B.) Ltd., 4 Nile St, N.1.

"Cleanmaster" vacuum cleaners—repairers of? E.S.—Electrix Ltd., Sterling Wks, Dagenham, Essex.

"Dee Gee" egg boilers—makers of? C.J.B.—David Griffin Ltd., 39 Wimborne Rd, Poole, Dorset.

Surveyor: J. R. Miles, Council Offices, Dacre St.

22 Nov.—Musselburgh B.C. Supply and erection of 66 15 ft and 15 25 ft concrete columns and installation of mercury and sodium lighting in various roads. Burgh Surveyor, Municipal Offices.

24 Nov.—Dublin. Electrical installation in proposed pathological laboratory and mortuary building at Sir Patrick Dun's Hospital. Details from consulting engineers: R. E. Jacob, 98 St. Stephen's Gn, Dublin. Deposit £10.

24 Nov.—Middlesex C.C. Contract Sub. 39. Wiring, lighting and heating of power house at Deephams Sewage Wks, N.9, by contractors with d.c. experience. Contract includes supply of miscellaneous plant and an automatic telephone exchange. Details from consulting engineers: J. D. and D. M. Watson, 67 Tufton St, S.W.1. Deposit £10 10s, made payable to the consultants.—Advertised in this issue.

25 Nov.—Manchester C.C. Electrical installation in Harpurhey Technical High School for Girls. City Architect, P.O. Box 488, Town Hall.

28 Nov.—Aberdeen C.C. Supply of lamps during 1961. Superintendent of Lighting, 262 King St.—Advertised in this issue.

30 Nov.—Tottenham B.C. Supply of (Item 3) lamps for year.—See 27 Oct. issue.

2 Dec.—Braintree and Bocking U.D.C. (1) Erection of 112 Group "B" prestressed concrete columns; (2) supply, erection and wiring of 115 45/60 W sodium lanterns; (3) laying cable ducts; (4) dismantling existing installation; (5) incidental works. Engineer and Surveyor, Town Hall, Braintree. Deposit £2 2s.—Advertised in this issue.

5 Dec.—Chigwell U.D.C. (i) Supply of (a) 21 steel columns and (b) lanterns/lamps; (ii) erection and installation of 21 200 W sodium units for A11 No. 2 lighting scheme. Engineer and Surveyor, Council Offices, Old Station Rd, Loughton. Deposit £2 2s.

5 Dec.—Manchester C.C. Supply and installation of outside lighting of existing aeration plants at Davyhulme Sewage Wks. City Surveyor, Town Hall, Manchester 2.—Advertised in this issue.

12 Dec.—Stockport B.C. 2. Electrical installation proposed Welfare Clinic, Longford Rd West, Reddish. Documents, available on 10 Nov., from Borough Architect, Town Hall.

13 Dec.—Kirkcaldy T.C. (b) Electrical work in erection of new hall at Links St. Details from quantity surveyor: G. Cubbage, 203 High St, Kirkcaldy.

14 Dec.—Matlock U.D.C. Supply and installation complete of nine sewage pumps at four pumping stations in Darley Vale.—See 6 Oct. issue.

No date stated—N. of Scotland H.E.B. 60 MVA transformer for Persley substation, Aberdeen.—Advertised 13 Oct. issue.

No date stated—St. Faith's and Aylsham R.D.C. Supply of columns, lanterns, lamps and auxiliary equipment.—See 13 Oct. issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

11 Nov.—India. L.T. insulators. Superintending Engineer (Proc.), Rajasthan State E.B., Power Hse, Jaipur. B.o.T. (ESB/27850/60).*

11 Nov.—Pakistan. 36,000 lb l.t. bitumen compound; 4,000 lb plastics compound; l.t. pin and shackle insulators. Director of Stores, W.A.P.D.A., Gardee Trust Bldg, Old Anarkali, Lahore. B.o.T. (ESB/28200 and 28291/60).*

14 Nov.—America. Three items disconnect horn gap switches and disconnect fuses. Dept. of Interior, Bureau of Reclamation, C. S. Shisler, Contract Purchase Unit, Bldg 53, Denver Federal Center, Colorado. B.o.T. (ESB/28199/60).*

14 Nov.—Burma. 5, 10 and 15 A three-pin plugs/sockets, tumbler switches and 9 in. Coolicon shades. Director-General, Union of Burma Purchase Board, St. John's Rd, Rangoon. B.o.T. (ESB/27864/60).*

14 Nov.—India. 35,000 yd l.t. and h.t. p.i.l.c.d.s.t.a. cable. General Manager, Delhi E.S.U., Rajghat, P.O. Box 589. Bo.T. (ESB/27666/60).*

14 Nov.—India. 132 kV transmission line conductors and accessories. Superintending Engineer (Projects), Madhya Pradesh Electricity Board, Jabalpur. B.o.T. (ESB/27619/60).*

15 Nov.—America. Ten items wire and cable including control cable and wire. Dept. of the Interior, Bonneville Power Administration, 1001 N.E. Lloyd Boulevard, Portland, Oregon. B.o.T. (ESB/28475/60).*

15 Nov.—America. Seven 1,500 kW diesel engine generating sets. U.S. Army Engineer District, Mobile Corps of Engineers, Bldg 3, 2301 Grant St, Mobile, Alabama. B.o.T. (ESB/28483/60).*

15 Nov.—Pakistan. 14 items accessories including lampholders, switches, plugs and sockets. Director of Stores, Electricity, Water and Power Development Authority, Gardi Trust Bldg, Old Anarkali, Lahore. B.o.T. (ESB/28167/60).*

16 Nov.—Australia. Ten mile 2·2 kV 0·03 twin core, wire armoured lead sheathed cable. Secretary, Victorian Railway, Spencer St, Melbourne C.1. B.o.T. (ESB/28112/60).*

16 Nov.—Australia. 230 kV transformers for Terang terminal station. 72,000 10 in. disc insulators. State E.C. of Victoria, William St, Melbourne. B.o.T. (ESB/28170 and 1/60).*

16 Nov.—New Zealand. Overhead travelling crane. Town Clerk, P.O. Box 2199, Wellington C.1. B.o.T. (ESB/28459/60).*

16 Nov.—Pakistan. 24 motor driven pumping sets. Deputy Director-General, Industries, Trade and Supply, P.I.D.C. Hse, Motijheel, Dacca. B.o.T. (ESB/27884/60).*

17 Nov.—America. Load-frequency control set for Watertown power system operations office and telemetering equipment for Rainbow substation. Dept. of the Interior, Bureau of Reclamation, Bldg 53, Denver Federal Center, Colorado. B.o.T. (ESB/28114/60).*

18 Nov.—S. Africa. Armoured underground telephone cable and accessories for S.A. Railways. Chairman, Tender Board, P.O. Box 7784, Johannesburg. B.o.T. (ESB/27633/60).*

21 Nov.—Australia. Two 53-cell 3,000 Ah Planté type batteries, two 4-cell 200 Ah batteries and chargers. Commercial Manager and Secretary, E.C. of N.S.W., Box 5257, G.P.O., Sydney. B.o.T. (ESB/28148/60).*

22 Nov.—America. Two 55,555 kVA 13·8 kV vertical shaft alternators for Trinity Power Plant. Dept. of the Interior, Bureau of Reclamation, Bldg 53, Denver Federal Center. B.o.T. (ESB/27664/60).*

23 Nov.—Pakistan. Lighting fixtures and refrigerators. Director of Supply, East Pakistan, P.I.D.C. Hse, Motijheel, Dacca. B.o.T. (ESB/28139/60).*

8 Dec.—Sudan. Six items p.i.l.c. telephone cable. Controller of Stores and Workshops, Dept. of Posts and Telegraphs, Light Industrial Area, Khartoum South. B.o.T. (ESB/27625/60).*

14 Dec.—India. Two 50 kW short-wave radio transmitters. Tender reference SE 4/3972-L/111-A, fee 15s, from Directorate-General of Supplies and Disposals, N.I.C. Bldg, Parliament St, New Delhi.

15 Feb.—India. Railway 25 kV o/h equipment for (i) Sealdah to Ranaghat (250 km); (ii) Dum Dum Junction to Bongaon (80 km). General Manager and Chief Engineer, Railway Electrification, 235 Lower Circular Rd, Calcutta 20. B.o.T. (ESB/28103/60).*

CONTRACTS PLACED

Birmingham Hospital Board. (a) Rewiring work and (b) o.c.b's for Lea Castle Hospital, Bromsgrove; (a) Whittaker Bros. Ltd., £1,176 and (b) Midlands E.B., £1,415. Rewiring Birmingham and Midland Eye Hospital, Dale Electric Contractors (Birmingham) Ltd., £17,191. Electrical services renewal at Lucy Baldwin Maternity Hospital, Industrial and Domestic Lighting and Power Co. Ltd., £1,975. Recommended.

Blackburn B.C. Electrical installations in 108 Montague St redevelopment dwellings, North Western E.B., £15,993.

Leeds C.C. Road heating for approach to Seacroft garage, Yorkshire E.B., £1,425. Electrical work in 252 maisonnettes on three sites, N. G. Bailey and Co. Ltd., £26,160. Recommended.

Leek U.D.C. Supply and erection of 130 steel columns complete with 60 W sodium lanterns, Abacus Municipal Ltd.

Lowestoft B.C. Electrical installations in 50 Gunton estate houses, Hughes (Lowestoft) Ltd., £1,771. Recommended.

Manchester C.C. Electrical installations in: 117 dwellings, Partington, F. L. Bampton Ltd; shops and maisonnettes, Lomond Rd, Peel Hall, B. French Ltd.; Victoria Pk Secondary School, S. Dickinson Ltd.; Whalley Range Grammar School for Girls, S. Barratt and Co. (Manchester) Ltd.; St. Mary's Rd Primary School, F. L. Bampton Ltd.

Newcastle Regional Hospital Board. Electrical installation in alterations and additions to Winterton Hospital, Sedgefield, James Scott and Co., £1,873.

Newcastle upon Tyne C.C. Lighting improvements at Whickham View School, Dougal and Railton Ltd., £3,237. Recommended.

Oxfordshire C.C. Supply and erection of five 25 ft and seven 35 ft steel columns with 140 W and 200 W sodium lighting, Abacus Municipal Ltd.

Surrey C.C. Rewiring of St. Nicholas Boarding School, Buchanan and Curwen Ltd., £1,120.

TRADE NOTES

Change of address. The Research and Development Division of Cawkell Research and Electronics Ltd. is now at 99 Uxbridge Rd, Ealing, W.5. Telephone: Ealing 7585.

The Automotive, Aircraft and Stationary Batteries Sales Divisions of Pritchett and Gold and E.P.S. Co. Ltd. have this week moved to the company headquarters at Dagenham Dock, Essex, where a new two-storey block has been built.

London office. S.R.O. Bearing Co. (Sales) Ltd., the recently formed British sales organisation of SRO Ball Bearing Works, Schmid-Roost Ltd., have now opened premises at 164 Camberwell Rd, S.E.5. Telephone: Rodney 6222.

New depot. A.E.I. Lamp and Lighting Co. Ltd. are opening a new Croydon depot at 111-113 Stafford Rd, Wallington, Surrey, on 7 Nov. The telephone No. is Franklin 1141.

Agencies. Erskine, Heap and Co. Ltd. after closing the agency arrangements with S. T. Pemberton and Co. Ltd. by mutual consent, have appointed their own technical sales engineer, Mr P. H. Baggott, of 55 Copthall Rd, Handsworth, Birmingham 21, to take charge of sales activities in the Midlands area.

Pyrotenax Ltd. announce that their Bulawayan agents, Founders Electric Ltd., of Bulawayo, have now been appointed to handle Pyrotenax m.i.c.c. cable for the whole of Southern Rhodesia.

BUSINESS PROSPECTS

Aldershot B.C. Tender: 116 Heron Wood estate houses, "Homeville" type. Engineer.

Atcham R.D.C. Tender: Eight flats in two blocks, Cross Houses. Engineer and Surveyor.

Basingstoke. Montgomerie Reid Engineering Co. plan extensions to Cufaude La, Bramley, works.

Bedford. W. H. Allen, Sons and Co. plan research laboratory, Beddenham. Quantity Surveyors: A. L. Currie and Brown, 32 Clarendon Rd, Watford.

Birkenhead. Liverpool Regional Hospital Board, Pearl Ass. Hse, Castle St, Liverpool 2, to adapt premises for use as hospital.—Roslyn St premises planned by Stylewear Manufacturing Co., 515 New Chester Rd.

Birmingham T.C. Tender: Contract 700: Eight two-storey dwellings, Hay Mills; Contract 726: four shops and five dwellings, Longbridge; and Contract 713: 34 dwellings, Acock's Green. Architect.

Brandon. Tonay Ltd., Durham Rd, Esh Winning, plan factory, offices and canteen.

Bristol. The Bristol Royal Workshops for the Blind plan extending the engineering department at £20,000 cost.—Pinchin Johnson and Assoc., 21 High St, plan warehouse on Brislington trading estate.—Archie Allen Motor Cycles plan building on site of 111-115 St. George's Rd.—Parcar Ltd. of London plan multi-storey car park at Princes St and Narrow Quay.

Bromley B.C. Tender: 104 Turpington La flats. Engineer.

Burton upon Trent. £2,700 rewiring of Union St premises of the Technical College planned.

Cambridge. Howell, Killick and Partridge, 4 Fitzroy Sq, W.1, architects for University's science library.

Cardiff. Minags Investments to develop sites of 45-53 The Hayes for shops and offices.

Carlisle. Samuel Jespers Ltd. and John Collier to reconstruct shop premises in English St.—T.C. plans conversion of Crosby Aerodrome into civic airport. Engineer.

Cheltenham. Homan and Rodger, St. George's Rd, plan 6,840 sq ft Tewkesbury Rd industrial building.

Cobham. Gotch and Ptnrs, 8 City Rd, E.C.1, architects for shops and maisonnettes for National Mutual Life Assurance Society, 39 King St. E.C.2.

Colne. Visi-Chick Brooder Co., Bradford Mill, plan £30,000 factory extensions.—Neilson Ice Cream and Frozen Food Co., Broad St, Nelson, Lancs, plan £100,000 distribution depot on White Walls estate.

Co. Wexford, Eire. £¼ million extension scheme planned for superphosphate production by Albatross-Windmill Fertiliser Co., New Ross, Co. Wexford. Architect: D. O'Neill Flanagan, 12 O'Connell St, Waterford.

Croydon B.C. Tender: 234 dwellings as Stage 4 of Shrublands housing estate redevelopment. Engineer.

Dartford B.C. Tender: Four blocks of flats totalling 33 units with shops and garages. Clerk.

Don Valley. Divisional Education Executive plans new junior mixed and infants' school at Armthorpe. Executive's Clerk, Doncaster.

Dumfriesshire. E.C. approves layout of Annan Academy. Cost £400,000.

Durham T.C. Tender: 48 dwellings, Newton Hall estate. Engineer.

Erith. Barnes, Challen and Cross, 74 Gloucester Pl, W.1, architects for £15,000 Submarine Cables Ltd. extensions.

Gillingham B.C. Tender: 20 houses—Stage III of Stratford estate—Henley Close, Rainham. Engineer.

Glasgow T.C. Tender: College of Further Education, Langside, Glasgow S.2. Architects: Boissevain and Osmond, 2 Clairmont Gdns.

Glenrothes. 34,000 sq ft extensions to factory planned by Beckman Instruments, Queensway industrial estate. Architect: Peter Tinto, Woodside, Glenrothes.

Gosforth. Newcastle Hospital Board, Benfield Rd, Newcastle, plans out-patients' dept. at W. J. Sanderson Orthopaedic Hospital.

Greatham. Cerebos Ltd., Greatham, plan factory extensions. Architect: L. Auton, Regent Bldgs, York St, West Hartlepool.

Grimsby. Immingham factory planned by D. Byford and Co., Rotherham Rd, Maltby.—R.D.C. Further Fairway Estate and Immingham houses planned. Surveyor.

Halesowen B.C. Tender: 27 flats and maisonnettes at Bath Meadow, Belle Vale. Architects: A. T. Butler and Ptnrs, 31 Priory St, Dudley.

Hartlepool T.C. Three blocks of eight-storey flats planned providing 144 units of accommodation in Sea View Terr area. Engineer.

Hastings B.C. Traffic signals planned for junction of White Rock and Robertson St. Cost: £4,750.

Haverfordwest. A. and E. Arnold and Co., Marsh Yard, plan Johnston factory.

Hayes. G. H. Pike, 14 Lincoln's Inn Fields, architects for Dr Tripletts C.E. School at £55,000.

Heston and Isleworth. W. E. and E. M. Cross, The Studio, Osterley Rd, architects for Read Manufacturing Co.'s two-storey factory extensions, Springwell Rd.—B.C. Tender: Burnham Gdns, Cranford branch library. Surveyor.

Holland C.C. £249,650 new College of Further Education planned at Boston. Architect.

Jarrow. T.C. Four shops and maisonnettes planned at Fellgate Ave, Boldon Colliery.

Kingston upon Thames. £35,000 factory planned for Delta Technical Services, Delta Wks, Cowleaze Rd, Kingston.

Lanark. James Macfarlane and Co. (Pollockshaws) plan £12,000 factory, Highbury Ave.

Liverpool. Duttons Ltd., 34 Pall Mall, Liverpool 3, plan new printing works.—Health Committee plans hostel for aged persons in Westminster Rd.

London. National Sea Training Schools, 146 Minories, E.C.3, plan new premises at St. Katherine's Dock, St. Katherine's Way, Stepney, E.—Verner Rees, Lawrence and Mitchell, 38 Holland Villa Rd, W.14, architects for extensions to Westfield College, N.W.3.—E. Alec Colman Group, 5 Hyde Park Gate, S.W.7, plan shop/office block at 40-48 High St, W.3, and premises on Gaumont Cinema site.—Sydney Clough, Son and Ptnrs, 39 Devonshire St, W.1, architects for multi-storey car park/showrooms/offices, Grosvenor Rd area, S.W.1.—Ian Fraser and Assoc., 15 Bedford St, W.C.2, architects for six-storey offices at Caxton St, S.W.1.—Calderhead and Scobie, 7 Friars Stile Rd, Richmond, Surrey, architects for 250-bedroom hotel at Norfolk Sq, Paddington, W.2.—Ardin and Brookes and Ptnrs, 129 Mounty St, W.1, architects for block of shops at 150-162 Edgware Rd, W.2.—J. Smith, 49 Goodge St, W.1, plans shops and flats at 91-97 Church St, N.W.8.—Summer and Derwent, 151-159 Queensway, W.2, architects for rebuilding of 94-98 Oxford St, W.1.—Clifford Culpin and Ptnrs, 39 Doughty St, W.C.1, architects for London and Overseas Students' centre, Portland Pl, W.1.

Luton B.C. Tender: £250,000 Central Library. Architect.

Manchester. Powell and Moya, 36 Gt. Smith St, S.W.1, architects for Hospital Board's Wythenshawe Hospital.

Market Harborough U.D.C. Two-storey extension to Council Offices planned. Surveyor.

Middlesbrough. Jordison and Co., Marton Rd, plan new works and offices, Longlands Rd.—B.C. Further stage of street lighting programme to cost £45,200.

Middlesex. E.C. plans 100-student hostel for Brunel College of Technology, Acton, W.3.—Also laboratory and workshop block at Willesden Technical College and stage one of Enfield Technical College extensions.

Newcastle. Municipal College of Commerce planned, and first instalment of Colleges of Art and Industrial Design. City Architects' Dept., 18 Cloth Market, Newcastle.—T.C. plans block "C" of new town hall at Barras Bridge and flats and maisonnettes in Napier St and Walker Rd.—C. Solomon, 30 St. Mary's Pl, architect for Master Builders' Federation's planned offices in North View and Elvet St.

Norwich. Chaplin and Burgoine, 4 Cathedral Close, plan offices, etc., Thorpe Rd.

Oldham B.C. Tender: 17 houses, 32 flats and two shops with living accommodation, Littlemoor La redevelopment. Quantity Surveyors: Cameron and Middleton, 21 Queen St.—Welfare Services Committee plans new £56,000 Holts estate home.

Oxford. St. Edward's School plans three boarding houses at Woodstock Rd.

Preston. Manchester Regional Hospital Board, Cheetwood Rd, Manchester, plan out-patients' department at Sharoe Green Hospital, Fulwood.

Pudsey. J. T. Bell and Sons (London), 128 Park La, W.1, promoters of scheme for parade of shops and five-storey flats, Church La.

Rawmarsh U.D.C. Tender: 24 pairs of houses and 13 pairs of bungalows, Monkwood No. 2 Estate. Engineer.

Redcar B.C. Tender: 492 dwellings, Lakes Neighbourhood unit. Architects: Frederick Gibberd, 19 The Rows, Stonecross, Harlow.

Redditch. Lodge Park Developments plan five shops, a supermarket and maisonnettes on site of picture house.

Romford, Fuller, Hall and Foulsham, 212 High Holborn, W.C.1, architects for Eastern Rd offices.

Rotherham. Pearl Assurance, High Holborn, W.C.1, plan block of shops with offices at Moorgate St.

Slough. Slough Estates plan 42 new small factories on trading estate.

Southport. M.T. Divisional Rd Engineer preparing trunk road lighting for main route to Southport through Scarisbrick.

South Shields. S. W. Milburn and Ptnrs, 9 Esplanade, Sunderland, architects for Newcastle Hospital Board's planned Ingham Infirmary extensions.—Meade Taylor and Wilson, 33 Lansdowne Rd, W.1, architects for hostel at Marine and Technical College for 90 students.

Stockport B.C. Class "A" lighting planned at Shaw Heath and conversion from gas in Reddish area. Costs: £1,527 and £41,299.

Stockton-on-Tees. J. T. Bell and Sons, Market St Chmbrs, Newcastle, plan housing developments at Harrowgate La area for 628 houses.

Sunderland. Newrick and Blackbell, 58 John St, architects for Camrex Paints' Hendon Rd laboratory.—E.C. plans additions to West Park College of Further Education. Borough Architect: H. C. Bishop, Grange Hse, Stockton Rd.

Surbiton. Hough Bros., 104 Roebuck Rd, plan factory extensions.

Swansea B.C. Tender: Pentrepoeth Rd, Morriston, branch library. Architect.

Swindon. Holland & Hannen and Cubitts (Gt. Britain), 1 Queen Anne's Gate, S.W.1, contractors for £3½ million construction plant at Stratton St. Margaret for Pressed Steel Co.—G. Brown and Ptnrs, Baldwin St, Bristol, architects for site development at High St/Newport St for Shop Parades Ltd.

Tavistock R.D.C. Tender: 22 dwellings, Drakes Park, Bere Alston. Clerk.

Tonbridge. Sir William Holford and Ptnrs, 2a Angel Court, E.C.2, architects for extensions at Tonbridge School.

Tunbridge Wells B.C. Tender: 126 Sherwood estate dwellings. Surveyor.

Tynemouth. Whitehouse Primary School planned. Stage I to accommodate 360 pupils and Stage II another 200. Architects: J. G. Cowe and Son, Claremont Pl, Newcastle.

Business Prospects—Continued

Watford. Cope, Cooper and Co. plan factory and offices, Holywell estate (Plot 7). —Typesetting Co., 83 Sidney Rd, plan factory and offices, Holywell estate.—Pitt and Underwood, 16 Vale Rd, Bushey, plan factory and offices at Greycaines industrial estate, Bushey Mill La.—New Era Laundry to move from King's Ave to Holywell industrial estate.—£365,000 buildings planned for Physics Group and D.S.I.R. M. of W. architects' dept., Abell Hse, John Islip St, S.W.1.

West Bromwich. Crystallised Confections plan Tunnel Rd factory.—Lavender, Twentyman and Percy, 35 Waterloo Rd, Wolverhampton, architects for steel fabrication shop, Kelvin Way, for Bromford Iron and Steel Co.—H. Holland, 394 High St, West Bromwich, architect for Harville Hawthorne's industrial buildings and offices for Templeton Properties.

West Hartlepool. The Expanded Metal Co. plan extensions.—Bell and Spouse, 10 Scarborough St, architects for addition to Brierton Boys' Secondary School and West Hartlepool Boys' Grammar School.

Westminster T.C. £300,000 modernisation of street lighting planned.

Whittlesey U.D.C. 87 houses, 16 flats and 12 bungalows planned in New Rd development. Surveyor.

Wisbech B.C. Tender: 50 Tinkers Drove area houses. Engineer, Church Terr.

Wolverhampton. Ministry of Health approves in principle £300,000 scheme for five new old peoples' homes.—B.C. Tender: Home for aged persons and flatlets at Broadway, Bushbury. Engineer.

Worcester T.C. Tender: 171 Warndon estate traditional dwellings. Engineer and Surveyor.

Worthing. C. L. Bencard, 243 Acton La, N.W.10, plan laboratory and office at Clarendon Rd.

York. Governors of St. John's College plan Garden St and Heworth Croft hostels.

Gazette Announcements

COMPANIES ACTS

Penelectric Appliance Co. Ltd. Mr R. W. Hellyer, Brotherton Chmbrs, Westgate, Leeds 1, appointed liquidator at extraordinary general meeting on 20 Oct. for the purpose of voluntarily winding-up.

Bulle Products Ltd. Final meeting of members to be held at 18 Hyde Gdns, Eastbourne, on 23 Nov., at 3 p.m., to approve the liquidator's accounts.

Vactric (Mnfg) Ltd. Meeting of creditors to be held at Houldsworth Hall, 90 Deansgate, Manchester 3, on 7 Nov., at 2.45 p.m.

U-Name-it Ltd. First meetings of creditors and contributories to be held at Royal Bldg (First Floor), St. Andrew's Cross, Plymouth, on 4 Nov., at 11 and 11.30 a.m., respectively.

Safe-Beam Lamp Ltd. Last day for receiving proofs for intended dividend: 11 Nov., to liquidator: W. H. Haigh, Somerset Hse, 37 Temple St, Birmingham 2.

Voluntary Liquidation

Domestic Electrix (Kent) Ltd., 59a High St, Rochester, retailers of electrical appliances.

The statement of affairs shown to a recent meeting of creditors disclosed liabilities £13,363, of which £10,652 was owing to trade creditors, against assets of £8,402.

The company, which took over an existing business, was registered in January, 1959, with an issued capital of £1,000.

Creditors passed a resolution for the appointment of Mr H. C. Hedges, accountant, of Poppleton and Appleby, 4 Charterhouse Sq, E.C.1, as liquidator.

BANKRUPTCY ACTS

Receiving Orders

Croydon. T. G. Davison, electrical dealer, trading as Woolwich Vacuum Supplies, at 14 Perry Hall Close, Orpington. Receiving order dated 17 Oct.

Liverpool. J. Jones, electrical dealer, trading as Stanley Electric Supplies, of 574 Prescot Rd, Liverpool. Receiving order dated 14 Oct.

Leicester. N. C. Ward, electrical appliance retailer, carrying on business as Newline Household Suppliers at 92 Pindar Rd, New Parks Estate. Receiving order dated 20 Oct.

Chester. I. M. Robinson, radio, television and electrical dealer, carrying on business as Robinson's Radio, TV and Electrical Services, at 4 Down Hill, High St, Bagillt, and formerly at 44 Castle St, Caerwrle, Flint. Receiving order dated 20 Oct.

York. M. W. Walsh, electrical dealer, of 59 Holgate Rd, York. Receiving order dated 20 Oct.

Wigan. J. Ball, electrical contractor, formerly carrying on business at 36 Crompton St, Wigan. Receiving order dated 24 Oct.

First Meeting and Public Examination

Slough. J. S. Sizmore, electrical retailer and contractor, of 12 Stoke Rd, Slough. First meeting: 11.30 a.m., 4 Nov., at 58-61 York Terr, Regent's Pk, N.W.1; and public examination: 11.30 a.m., 25 Jan., at Law Courts, Windsor Rd, Slough.

Appointment of Trustees

Durham. J. M. Hill, electrical, television, radio dealer, etc., carrying on business at 24 Station Rd, Ushaw Moor. Mr E. Taylor, 30-32 Grey St, Newcastle, appointed trustee as from 27 Sept.

Sheffield. J. W. Trickett, electrical domestic appliance dealer, carrying on business at 6 Turner La, Whiston, near Rotherham. Mr P. Cardwell, 93 Queen St, Sheffield 1, appointed trustee as from 26 Sept.

Birkenhead. G. Ford, fluorescent lighting specialist, carrying on business at 110a Brighton St, Wallasey. Mr C. A. Huntington, 41 North John St, Liverpool 2, appointed trustee as from 28 Sept.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Auto-Chief. B800,221. Class 9. Control apparatus for automatically maintaining predetermined temperatures in cooking appliances. British Thermostat Co. Ltd., Teddington Wks, Windmill Rd, Sunbury-on-Thames.

Bluecon. 805,793. Class 9. Capacitors. Dubilier Condenser Co. (1925) Ltd., Ducon Wks, Victoria Rd, W.3.

Burgot Automatic Alarm. B802,989. Class 9. Burglar and fire alarms, etc. Burgot Alarms Ltd., 26 Westbourne Grove, W.2.

Caravelle. 806,574. Class 9. Electric irons, etc. S. D. Rand Ltd., 29 Beak St, Regent St, W.1.

Electrochord. B802,717. Class 9. Wireless receiving sets, etc. George Whitaker and Son Ltd., 5-6 Lorrimore Bldgs, Olney Rd, S.E.17.

Philetta. 806,250. Class 9. Semi-conducting devices, discharge tubes, radio, telephone, and sound-recording apparatus, etc. Philips Electrical Ltd., Century Hse, Shaftesbury Ave, W.C.2.

Pyromajor and **Pyrominor.** B802,240/1. Class 9. Apparatus for indicating and controlling temperature, etc. Sifam Electrical Instrument Co. Ltd., Leigh Court, Higher Lincombe Rd, Torquay.

Registrac. 806,350. Class 9. Apparatus, etc. Sargrove Electronics Ltd., Alexandra Rd, Hounslow, Middx.

Sensikator. 804,859. Class 9. Electronic apparatus, etc. Burndept Ltd., 681 Salisbury Hse, Finsbury Circus, and London Wall, E.C.2.

Sheerlock. B796,624. Class 11. Refrigerator cabinets, refrigerators, etc. General Motors Corpn., West Grand Boulevard and Cass Ave, Detroit, Michigan, U.S.A.

Sigmatic. 805,180. Class 7 and 805,181. Class 9. Welding machines, etc. Union Carbide Corpn., 30 East 42nd St, New York 17, N.Y., U.S.A.

Splendor. 805,532. Class 10. Heated blankets. Splendor England Ltd., 7c Lower Belgrave St, S.W.1.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

D. Alldridge and Sons Ltd., 13 Oxford St, Southampton. To take over business of electrical engineers and contractors carried on at Southampton by Douglas E. O. Alldridge, etc. Nom. cap.: £50,000. Dirs.: Douglas E. O. Alldridge, Hilda M. Alldridge, Douglas Alldridge, Junr., John Alldridge and Alwynne A. Thomas.

Bexelectric Ltd., 71 High St, Polegate, Sussex. Wholesalers, retailers, manufacturers of and dealers in dynamos, motors, armatures, etc. Nom. cap.: £100. Dirs.: Maurice W. Beck, Mrs R. G. Beck and Geo. N. Henty.

British Electrical Approvals Board for Domestic Appliances, 26-27 Cockspur St, S.W.1. Word "Limited" omitted from title by licence of the Board of Trade. The income and property of the Company, whencesoever derived, shall be applied solely towards the promotion of its objects. Management board include: W. J. Bird, J. I. Bernard, H. A. R. Binney, L. C. Penwill and P. B. Etheridge. Subs.: British Electrical and Allied Manufacturers Association, British Electrical Development Association, British Standards Institution, Electrical Contractors' Association and P. B. Etheridge (representing Electrical Wholesalers' Federation).

Chas. Cooke (Talgarth) Ltd., Wye Chmbrs, 24 Castle St, Hay-on-Wye. To carry on business of electricians, mechanical engineers, etc. Nom. cap.: £5,000. Dirs.: Wm. C. Cooke and Eileen G. Cooke.

S. N. Fordyce and Sons Ltd., Upper Richmond Rd West, S.W.4. Electricians, radio engineers, electrical engineers, etc. Nom. cap.: £4,000. Dirs.: Stewart N. Fordyce and Gladys B. Fordyce.

Glacial Refrigeration Ltd., 46 Mostyn St, Llandudno. Radio, television, electrical and electronic engineers, refrigeration engineers, etc. Nom. cap.: £5,000. Dirs.: Leslie G. Odd and Winifred M. Odd.

I.M.D. (Electrical Instruments) Ltd., 13 South Molton St, W.1. Nom. cap.: £2,000. Dir.: Anthony C. Cadwallader.

Instrumec Ltd., 52 Brown St, Manchester. Electronic and electrical engineers, etc. Nom. cap.: £1,000. Permanent dirs.: Walter Reedy, Norman C. Thomas and Jas. M. Blyth.

Ponteland Electricals Ltd. Nom. cap.: £5,000. Dirs.: Stanley F. Jours, 23 Customs Hse Chmbrs, Quayside, Newcastle-on-Tyne; and Aldo Costella, 48 Western Way, Darras Hall, Newcastle-on-Tyne.

A. D. Speed (Electrical) Ltd., 30 Portland Rd, Aldridge, Staffs. Nom. cap.: £2,000. Dirs.: Alfred D. Speed and Alma O. Speed.

Technic Electries (B'ham) Ltd., 891 Pershore Rd, Birmingham 29. Nom. cap.: £1,000. Dirs.: Albert W. G. Newbery, Wm. A. Newbery and Wm. K. Bryan.

Thompson and Holme Ltd., 28 Mackenzie St, Slough, Bucks. Electrical engineers, etc. Nom. cap.: £500. Dirs.: Wm. J. Thompson and John R. Holme.

L. W. Yeates (Electro-Heat) Ltd., 21 Star Rd, Caversham, Reading, Berks. Nom. Cap.: £2,000. Dirs.: Leslie W. Yeates and Leonard J. Ridgus.

MEETINGS TO NOTE

THURSDAY, 3 NOV.

I.E.E. (Joint meeting with Civils and Mechanicals). "The Training of Overseas Graduate Engineers, with Particular Reference to the F.B.I. Scholarships Scheme," W. Abbott. Savoy Pl, W.C.2. 5.30 p.m.

A.S.E.E. (Brighton, Hove). "Electrification of the Railways," T. R. Humes. New Imperial Hotel, First Ave, Hove. 7.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (E. Midlands). "Instrumentation in Biophysics," F. A. Glover. College of Further Education, Greenclose La, Loughborough. 7.15 p.m.

I.E.S. (Birmingham). Ladies' Night. Botanical Gdns, Edgbaston. 7.30 p.m.

I.E.S. (Glasgow). "Lighting for Ships," J. T. Grundy. Joint meeting with Institution of Engineers and Shipbuilders in Scotland. Weir Hall, 39 Elmbank Cres. 6.30 p.m.

I.E.S. (Nottingham). "Horticultural Lighting," A. W. Gray. Electricity Centre, Carrington St. 6 p.m.

FRIDAY, 4 NOV.

I.E.E. (Medical Electronics Group). Discussion: "Electro-Convulsive Therapy." Savoy Pl, W.C.2. 6 p.m.

I.E.E. (N.E. Graduates and Students). "Aspects of Large Thermal Power Station Construction, Operation and Management," R. Lott. Grey Hall, King's College, Newcastle. 6.30 p.m.

A.S.E.E. (Liverpool). "Industrial Lighting," J. D. Ducker. Industrial Development Centre, M.A.N.W.E.B., Paradise St. 7.30 p.m.

A.S.E.E. (Stoke and Crewe). "The Development of Plastic Insulated Mains Cables, Jointing and Terminating," D. H. Booth. Royal Hotel, Crewe. 7.30 p.m.

A.S.E.E. (Wolverhampton and District). Dinner/dance at Star and Garter Hotel, Victoria St. 7.30 p.m.

N.E. ELECTRICAL CLUB ANNUAL DINNER, County Hotel, Newcastle upon Tyne.

INSTITUTION OF PLANT ENGINEERS (Kent). Branch Annual Dinner and Dance at Central Hotel, Gillingham.

A.P.L.E. (S. Western). Induction of chairman, followed by "Public Lighting Plan for Weston-super-Mare," J. R. Freer-Hewish, and "The Electricity Board's Part in Public Lighting," H. G. B. Dickinson. Town Hall, Weston-super-Mare. 2.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Fawley). "Automation in the Post Office," W. S. Roddis. Admin. Bldg, Esso Refinery. 5.30 p.m.

SATURDAY, 5 NOV.

I.E.E., MECHANICALS AND CIVILS (London Graduates and Students). Joint dance. Carlton Rooms, Maida Vale, W.9. 7 p.m.

MONDAY, 7 NOV.

I.E.E. Discussion: "The Impact of Television on Society." Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (N. Eastern). "Water-Turbine Driven Induction Generators," C. L. C. Allan. Neville Hall, Westgate Rd, Newcastle upon Tyne. 6.15 p.m.

I.E.E. (S. Midlands). "A Survey of Street Lighting and Its Future," W. R. Stevens and H. M. Ferguson. James Watt Memorial Institute, Birmingham. 6.30 p.m.

I.E.E. (Scottish Electronics and Measurement Group). "Advances in Semiconductor Devices and Circuits," J. Evans and T. H. Walker. Institution of Engineers and Shipbuilders, 39 Elmbank Cres, Glasgow. 6 p.m.

I.E.E. (Maidstone). "Subscriber Trunk Dialling," H. E. Francis. Maidstone Technical College. 7 p.m.

I.E.E. (Mersey and N. Wales). Annual dinner. Adelphi Hotel, Liverpool. 7 p.m.

N.E. ELECTRICAL CLUB. "Flameproof at Home and Abroad," M. J. Deering. County Hotel, Neville St, Newcastle upon Tyne. 6.30 p.m.

INSTITUTION OF MECHANICAL ENGINEERS (N. Eastern). "Economic Distribution of Steam," J. A. Robbins. Newcastle. 6 p.m.

A.S.E.E. (Bolton). "Under-floor Cable Ducts." Railway Hotel, Trinity St. 7.45 p.m.

A.S.E.E. (Essex). "Electric Floor-warming," G. C. Peacock and G. E. East. Angel Hotel Broadway, Ilford. 8.15 p.m.

A.S.E.E. (Leeds). "Metal Rectifiers," D. Magnall. Gt. Northern Hotel. 7.30 p.m.

A.S.E.E. (Sheffield). "Modern Lighting as Applied to all Phases of the Electrical Industry," V. L. Turp. Royal Victoria Hotel. 7.30 p.m.

TUESDAY, 8 NOV.

I.E.E. (Measurement and Control Section). Dinner. Café Royal. 7.30 p.m.

I.E.E. (Southern). "Error Correction in Digital Data Transmission System," J. E. Meggitt. The University, Southampton. 6.30 p.m.

I.E.E. (Mersey and N. Wales). "Submersible Pumping Plant," H. H. Anderson and W. G. Crawford. Joint meeting with the North Western Centre. Engineers' Club, Manchester. 6.15 p.m.

I.E.E. (N. Midlands). Discussion: "City and Guilds or National Certificate?" College of Technology, Calverley St, Leeds. 6.30 p.m.

I.E.E. (N. Ireland). "The Application of Irradiation in Industry," M. C. Crowley-Milling. Civil Eng. Dept., David Keir Bldg, Queen's University, Belfast. 6.30 p.m.

I.E.E. (Scottish Electronics and Measurement Group). "Advances in Semiconductor Devices and Circuits," J. Evans and T. H. Walker. Carlton Hotel, North Bridge, Edinburgh. 7 p.m.

I.E.E. (N.E. Graduates and Students). "Transistors—Their Operation and Application," K. W. Huddart. Sunderland Technical College. 6.30 p.m.

I.E.E. (N. Midlands Graduates and Students). "The Experimental Investigation of Space," P. J. Bowen. Gt. Northern Hotel, Wellington St, Leeds 1. 7 p.m.

INSTITUTION OF CIVIL ENGINEERS. "Some Contributions from Nuclear Power to Engineering Practice." I. Davidson, Gt. George St, S.W.1. 5.30 p.m.

I.E.S. "25 Years of Stage Lighting," F. P. Bentham. Federation of British Industries, Tothill St, S.W.1. 6 p.m.

A.S.E.E. (Aldershot and District). "Electrical Control," Dr W. L. Stern. Woking. 8 p.m.

A.S.E.E. (Chester and District). "The Protection of Electrical Installations," J. A. Robbins. Westminster Hotel, City Rd. 7.45 p.m.

A.S.E.E. (Newcastle-on-Tyne). "Temperature Controls." Roadway Hse, Oxford St. 7.30 p.m.

A.S.E.E. (S. Wales). "Fire Fighting and Prevention," C. N. Bidgood. Park Hotel, Park Pl, Cardiff. 7.30 p.m.

A.S.E.E. (York). "The Aims and Objects of the National Inspection Council," P. Laughton. Royal Station Hotel. 7.30 p.m.

BRITISH LIGHTING COUNCIL. Symposium on lighting at Building Centre, Portland St Manchester 1 until 9 Nov.

WEDNESDAY, 9 NOV.

I.E.E. (Southern). "The Design of Housing-Estate Distribution Systems Using a Digital Computer," R. L. Grimsdale and P. M. Sinclare. S.E.B. Showrooms, 17 New Canal, Salisbury. 6.30 p.m.

I.E.E. (N.W. Electronics and Communications Group). "The Applications of Microwaves," Prof A. L. Cullen. Engineers' Club, Manchester. 6.15 p.m.

I.E.E. (Rugby). Annual dinner. Masonic Hall, Rugby. 7.30 p.m.

I.E.E. (S.W. Scotland). "The Digital Computer," I. Cochrane. Institution of Engineers and Shipbuilders, 39 Elmbank Cres, Glasgow. 6 p.m.

I.E.E. (N. Lancs). "Some Aspects of Telephone Plant Protection in the Lancaster Area," L. Williams, N.W.E.B. Demonstration Theatre, Lancaster Rd, Lancaster. 7.15 p.m.

I.E.E. (Oxford). "Pumped Storage," V. G. Newman. S.E.B. District Office, 37 George St. 7 p.m.

I.E.E. (Sheffield Graduates and Students). "The Experimental Investigation of Space," P. J. Bowen. Sheffield University.

I.E.E. (S. Midlands Graduates and Students). "High Power Rectifiers," D. Finney. James Watt Memorial Institute, Birmingham. 6.30 p.m.

BRITISH NUCLEAR ENERGY CONFERENCE. Symposium: "Use of Secondary Surfaces for Heat Transfer With Clean Gases," Birdcage Walk, S.W.1, until 10 Nov.

INSTITUTION OF PLANT ENGINEERS (Leicester). "Industrial Power Generation," A. Wheating or J. M. Berridge. Midland Hotel. 7.30 p.m.

WOMEN'S ENGINEERING SOCIETY. "Railway Modernisation and Electrification," E. C. Cookson and A. H. Emerson. "Hope House," 45 Gt. Peter St, S.W.1. 7 p.m.

NEWPORT AND DISTRICT ELECTRIC CLUB. "The Design and Jointing of Low Voltage Plastic Insulated Mains Cable," D. H. Booth. King's Head Hotel. 6.30 p.m.

INSTITUTION OF PRODUCTION ENGINEERS (London Graduates). "Induction Heating," D. G. Jones. 10 Chesterfield St, W.1. 7.15 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Data Processing Section). "A Shaft Position Digitiser Using Synchros," T. Roberts, Manson Hse, 26 Portland Pl, W.1. 7 p.m.

I.E.S. (Manchester). Annual dinner. Café Royal, Peter St. 7 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Medical and Biological Electronics Group). "Diagnostic Applications of Ultrasonics," T. G. Brown. London School of Hygiene and Tropical Medicine, Keppel St, W.C.1. 6.30 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (N. Eastern). "Distribution of Sound and Television by Wire," A. W. Mews. Institution of Mining and Mechanical Engineers, Neville Hall, Westgate Rd, Newcastle upon Tyne. 6 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (W. Midlands). "Modern Computer Techniques," K. C. Johnson. Wolverhampton College of Technology. 7.15 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Scottish). "V.H.F. AM/FM Transistor Receivers," H. A. Heins. Dept. of Natural Philosophy, University, Drummond St, Edinburgh. 7 p.m.

A.S.E.E. (Birmingham). "Modern Light Sources and their Application," W. A. R. Stoyle, Birmingham Exchange and Engineering Centre, Stephenson Pl. 7.30 p.m.

A.S.E.E. (Luton). "The Aims of the Electrical Association for Women," Miss A. S. Lockhart. Luton College of Technology. Park Sq. 8.15 p.m.

THURSDAY, 10 NOV.

I.E.E. (Utilisation Section). "The Logmotor—A Cylindrical Brushless Variable-Speed Induction Motor," Professor F. C. Williams, E. R. Laithwaite, J. F. Eastham and L. S. Piggott. "Brushless Variable-Speed Induction Motors Using Phase-Shift Control," Professor F. C. Williams, E. R. Laithwaite, J. F. Eastham and W. Farrer. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (W. Wales). "The Shielding of Overhead Lines Against Lightning," J. H. Gridley. Conference Room, S. Wales Electricity Board, The Kingsway, Swansea. 6 p.m.

INSTITUTION OF CIVIL ENGINEERS. Discussion: "The Economics of Airlifts for Major Construction." Gt. George St, S.W.1. 5.30 p.m.

INSTITUTION OF PRODUCTION ENGINEERS (N. Midlands). "Machine Tool Control," C. J. Charnley. Queen's Hall, Grand Hotel, Leicester. 7.15 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Liverpool). "Some Recent Advances in Radiation Pyrometry," B. W. Barley. M.A.N.W.E.B. Industrial Development Centre. 7 p.m.

BRITISH INSTITUTION OF RADIO ENGINEERS (Scottish). V.H.F. AM/FM Transistor Receivers," H. A. Heins. Institution of Engineers and Shipbuilders, Elmbank Cres, Glasgow. 7 p.m.

A.S.E.E. (Bradford and District). "Power Transformers," J. Bennett. Midland Hotel. 7.30 p.m.

A.S.E.E. (S.W. London). "Under-floor Heating," L. Bishop; and "Maintenance of an Electro-plant Plant," B. Mitchison. Prince of Wales Hotel, S.W.19. 8.30 p.m.

FRIDAY, 11 NOV.

I.E.E. Joint meeting with Royal Aeronautical Society. "The Future of 'Electrics' and 'Electronics' in Aircraft and Guided Missiles," The Rt Hon The Viscount Caldecote. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Tees-side). Annual dinner and Reunion, Zetland Hotel, Saltburn-by-the-Sea. 7.30 p.m.

JUNIOR INSTITUTION OF ENGINEERS. "Railway Signalling Problems in a.c. Traction Areas," H. J. N. Riddle. Pepys' Hse, 14 Rochester Row, S.W.1. 7 p.m.

E.P.E.A. (Meter Engineers' Technical Group). Discussion: "Prepayment Methods." Caxton Hall, Westminster, S.W.1. 6.30 p.m.

SOCIETY OF INSTRUMENT TECHNOLOGY (Midlands). "The Common-sense Approach to Instrument Manufacture," C. E. T. Cridland. Lecture Theatre of the Byng Kendrick Suite, at the Gosta Green College of Technology, Aston St, Birmingham. 7 p.m.

E.I.B.A. BALL at Grosvenor Hse, at 7 p.m.

MONDAY, 14 NOV.

I.E.E. (Electronics and Communications Section). Discussion: "Tunnel-Diode Application and Circuitry." Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Mersey and N. Wales). "Teaching and Learning Machines," C. E. G. Bailey. Joint meeting with the North Western Association of the Institution of Civil Engineers. Town Hall, Chester. 6.30 p.m.

I.E.E. (Western). "The Measurement Basis of Electricity Supply Metering," J. W. Skinner. South Wales Institute of Engineers, Cardiff. 6 p.m.

I.E.E. (N.E. Measurement and Electronics). "Thermistors—Their Theory, Manufacture and Application," R. W. A. Scarr and R. A. Setterington. Rutherford College of Technology, Newcastle. 6.15 p.m.

I.E.E. (E. Anglia). "The Oral Presentation of Scientific Material," A. Clow. Technical College, Cambridge. 6.30 p.m.

I.E.E. (S. Midlands Supply and Utilisation Group). "Some Considerations in the Application of Power Rectifiers and Converters," J. P. McBreen. College of Technology, Gosta Green, Birmingham. 6 p.m.

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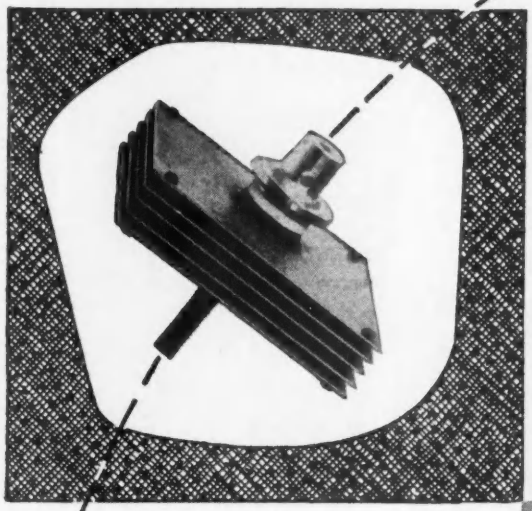
at lower D.C. voltages



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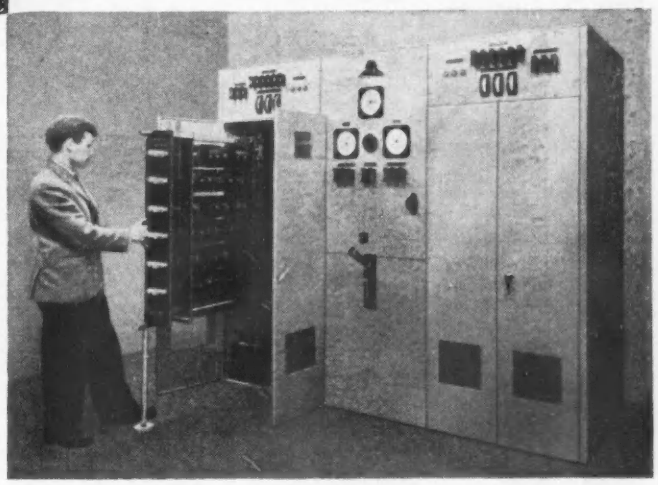

Greater efficiency — much greater at low voltages — plus reliability are features of Hewittic germanium rectifiers — designed and produced throughout against a rectifier engineering background of over 50 years. The illustrations show a Hewittic air cooled germanium diode and a 400 kW 230-0-230 volt D.C. (3 wire) Hewittic germanium rectifier for general workshop supply at the Crewe Locomotive Works, British Railways, London Midland Region. Silicon equipments can also be supplied.

Send for Publication R.193.

HACKBRIDGE & HEWITTIC ELECTRIC CO., LIMITED

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CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

URBAN DISTRICT COUNCIL of BRAINTREE and BOCKING

Street Lighting—Group "B"

TENDERS are invited on a FIXED PRICE basis (that is without cost variation clauses for labour and materials) from Contractors experienced in the type of work for:

1. Taking delivery and erection of 112 No. Group "B" Prestressed Concrete Columns.
2. Supply, erection and wiring up of 115 No. 45/60 watt Sodium enclosed lanterns.
3. The laying of cable ducts across carriageways.
4. The dismantling of the existing lighting installation.
5. Incidental works.

Plans, Conditions of Contract and other documents may be inspected at the office of the Engineer and Surveyor, Town Hall, Braintree, who will also supply Specifications, Bills of Quantities and Tender Forms upon payment of a deposit of £2 2s, which will be refunded upon the receipt of a bona fide tender and all documents.

Tenders in the plain sealed envelope provided endorsed "Tenders—Street Lighting" must be delivered to the Clerk of the Council, Town Hall, Braintree, before 12 noon on Friday, 2 Dec., 1960. Specifications and priced Bills of Quantities must be returned at the same time in sealed envelopes bearing the Tenderer's name and address.

The Council do not bind themselves to accept the lowest or any tender.

W. BALSON,
Clerk of the Council.

Town Hall,
Braintree,
Essex. (S 461)

MIDDLESEX COUNTY COUNCIL

East Middlesex Main Drainage
Contract Sub. 39
Electrical Installation

TENDERS are invited for the electrical installation work at Deephams Sewage Works, Edmonton, N.9.

The installation comprises the cabling for distribution from a power house to the various units on the sewage works. It includes internal wiring, lighting and heating of the power house and other buildings. The Contract also covers for the supply of miscellaneous items of electrical plant, and for an automatic telephone exchange.

The electricity supply will be 460 V/230 V d.c. and 415 V/240 V a.c. and tenderers are required to be experienced in handling d.c. equipment.

Tendering documents will be available early in November from the Consulting Engineers, J. D. and D. M. Watson, MM.I.C.E., 67 Tufton St, S.W.1, upon payment of a deposit of ten guineas which will be returned on receipt of a bona fide tender and return of all documents. Cheques should be made payable to J. D. and D. M. Watson.

The Council does not bind itself to accept the lowest or any Tender.

Tenders must be delivered to the Consulting Engineers not later than 24 Nov.

KENNETH GOODACRE,
Clerk of the County Council.

County Council of Middlesex,
Westminster, S.W.1.
(S 454)

CORPORATION OF THE CITY OF ABERDEEN

Lighting Department

TENDERS are invited for the supply of Electric Lamps to the Aberdeen Corporation Lighting Department during the year 1961. Tender forms and details may be obtained from the Superintendent of Lighting, 262 King St, Aberdeen, to whom tenders should be submitted on or before 28 Nov., 1960.

J. C. RENNIE,
Town Clerk.

Town Hse,
Aberdeen.
26 Oct., 1960. (S 447)

BOROUGH OF WREXHAM

GROUP "A" STREET LIGHTING
TRUNK ROAD A483 (PART)

Fixed-Price Tenders

INVITED for the supply, delivery and erection of 10 No. fluted steel columns and brackets having a mounting height of 25 ft, and Sodium Vapour 140 watt lanterns and lamps.

Conditions of contract may be inspected at the office of the Borough Engineer and Surveyor, 31 Chester St, Wrexham, from whom copies of the specification, Bill of Quantities and form of Order may be obtained.

Tenders to be delivered in a plain envelope endorsed "Street Lighting, Trunk Road" to be delivered to the undersigned, not later than 12 noon on Friday, 11 Nov., 1960.

PHILIP J. WALTERS,
Town Clerk.

Guildhall,
Wrexham.
Oct., 1960. (S 379)

CITY OF MANCHESTER

Davyhulme Sewage Works

TENDERS invited for supply, delivery and installation of Outside Lighting of existing Aeration Plants. Tender documents from City Surveyor, Town Hall, Manchester 2. Tenders returnable 5 Dec., 1960. (S 437)

APPOINTMENTS VACANT

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT CONSUMERS' ENGINEER

REQUIRED at Towyn in the Aberystwyth District. Salary within range £715/£805 per annum (N.J.B., E/11).

Applicants should have completed a recognised electrical apprenticeship and had some technical training. Duties will include estimating, preparation of specifications and supervision of contracting work, advising consumers on matters relating to electricity supply and the utilisation of electricity. The ability to speak Welsh and to drive would be an advantage.

The work is of an interesting nature, and the post is pensionable, with good working conditions and reasonable future prospects to suitable staff.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity Hse, Rhostyllen, nr. Wrexham. Closing date: 14 Nov., 1960. (S 473)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

KINGSTON POWER STATION
Vacancy No.215/60T.
ELECTRICAL MAINTENANCE ENGINEER

THE successful candidate will be responsible for the organisation and efficient working of the Electrical Repairs and Maintenance Department in a modern Power Station. He should be able to interest and lead his staff, to think for himself, and have abundant energy and initiative. Experience of Power Station plant and possession of H.N.C. in Electrical Engineering are desirable and an understanding of Budgetary Control would be advantageous.

Salary: N.J.B., Class G, Grade 6, £1,240/£1,375 per annum, including London Allowance.

Applications giving age, details of experience, qualifications, etc., and quoting vacancy number, should be sent to the Station Superintendent, Kingston Power Station, Down Hall Rd, Kingston upon Thames, Surrey, to arrive by 11 Nov., 1960.

W. H. DUNKLEY,
Divisional Controller.
(S 456)

LONDON ELECTRICITY BOARD

ARCHITECTURAL DRAUGHTSMAN

APPLICATIONS are invited for the above position in the Architect's Section of the Construction Branch of the Chief Engineer's Department at Lesco Hse, Stamford St, S.E.1.

Applicants should be neat draughtsmen and preferably have had several years' experience in an architect's office.

Pending determination as to the grading of the post within Schedule B of the National Joint Board Agreement, the salary will be in the provisional range of £755 per annum rising to £855 per annum, inclusive of London Allowance.

Application form obtainable from the Construction Engineer at the above address to be returned completed within 14 days of the publication date of this notice. Please quote ref.: PER/V/3054/T. (S 468)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

Vacancy No. 285/ET/60.

APPLICATIONS invited for the superannuable N.J.B. appointment of
ASSISTANT SHIFT CHARGE ENGINEER
at Aberthaw Power Station, The Leys, Aberthaw, Nr. Barry, Glam.

Salary: Schedule A, Class L, Grade 8, Scale 12, £1,350/£1,500 per annum, plus 10% shift enhancement.

Applicants should possess H.N.C. or equivalent qualifications, and have had operating experience in a modern power station.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 18 Nov., 1960. (S 485)

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

CLERK OF WORKS (ENGINEERING)

REQUIRED for supervision of site works in various establishments.

Applicants must have served an apprenticeship in mechanical or electrical engineering and have had not less than five years' experience of supervising site installations. They must be capable of supervising both mechanical and electrical work.

Salary scale, £800 x £40(5) x £50(1)—£1,050 plus £30/£50 London Weighting. Superannuable, Whitley Council conditions.

Apply, stating age, qualifications and experience, with names and addresses of two referees (preferably employers) to Secretary, North West Metropolitan Regional Hospital Board, 40 Eastbourne Ter, W.2, quoting reference 859, by 16 Nov. (S 460)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 40s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

ADMIRALTY

DEGAUSSING OFFICERS

10 POSTS for men at least 30 and under 55 on 1.9.60, who have had practical training in electrical engineering work and followed regular courses of study in electrical theory. Sound understanding of elementary theory of magnetism and intimate knowledge of ships essential. Experience of degaussing work and service in R.N. or Merchant Navy an advantage. Appointments for period of at least five years for service in U.K. or abroad as required. Salary: £795/£935. Promotion prospects. Write Civil Service Commission, 17 North Audley Street, London W.1, for application form, quoting S/5215/60. Closing date: 5 Dec., 1960. (S 445)

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER
DRAKELOW "B" POWER STATION
Vacancy No. 252/60.

APPLICATIONS are invited for the position of Assistant Shift Charge Engineer at Drakelow "B" Power Station, near Burton-on-Trent, Staffs.

Applicants should have received a sound technical training and have had experience in a modern power station. Preference will be given to candidates who possess the Higher National Certificate, or its equivalent.

Salary will be in accordance with Class L, Grade 8 (£1,350/£1,500 per annum), of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 19 Nov., 1960.

SECOND ASSISTANT STATION CHEMIST
WILLINGTON "A" AND "B" POWER STATION
Vacancy No. 243/60.

Applications are invited for the position of Second Assistant Station Chemist at Willington "A" and "B" Power Station, P.O. Box 27, Derby.

It is desirable that applicants have a University Degree or Associateship of the Royal Institute of Chemistry and experience in general chemical analysis, with particular experience in the use of physico-chemical apparatus such as U.V. Spectrophotometer, and a knowledge of statistical methods.

Salary will be in accordance with Class M, Grade 11 (£1,190/£1,325 per annum), of the National Joint Board Agreement.

Closing date for receipt of applications: 12 Nov., 1960.

SHIFT CHARGE ENGINEER
DERBY POWER STATION
Vacancy No. 244/60.

Applications are invited for the position of Shift Charge Engineer at Derby Power Station, Full St, Derby.

Applicants should have a sound technical training and considerable experience in a modern power station. Preference will be given to candidates who are Graduate Members of the Institution of Electrical or Mechanical Engineers, or who hold similar qualifications. A knowledge of pulverised fuel firing will be an advantage.

Salary will be in accordance with Class F, Grade 7 (£1,040/£1,165 per annum), of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 12 Nov., 1960.

SHIFT CHARGE ENGINEER
WILLINGTON "A" POWER STATION
Vacancy No. 245/60.

Applications are invited for the position of Shift Charge Engineer at Willington "A" Power Station, P.O. Box 27, Derby.

Candidates should have had a sound technical training and considerable experience in a modern power station. Preference will be given to candidates who are Graduate Members of the Institution of Electrical or Mechanical Engineers, or who hold similar qualifications. A knowledge of pulverised fuel firing will be an advantage.

Salary will be in accordance with Class L, Grade 6 (£1,535/£1,720 per annum), of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 12 Nov., 1960.

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ASSISTANT SHIFT CHARGE ENGINEER
COVENTRY POWER STATION
Vacancy No. 247/60.

Applications are invited for the position of Assistant Shift Charge Engineer at Coventry Power Station, Alderman's Green, Coventry.

Applicants are required to take charge of shift operation of boiler house plant and must possess a sound technical training, a good general engineering experience, and knowledge of the control and operation of water tube boilers, ancillary plant and the efficient combustion of chain grate stokers.

Salary will be in accordance with Class G, Grade 9 (£965/£1,090 per annum), of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 12 Nov., 1960.

GENERAL ASSISTANT ENGINEERS
SPONDON POWER STATION
Vacancy No. 248/60.

Applications are invited for the positions of General Assistant Engineers at Spondon Power Station, near Derby.

Candidates should be suitable qualified young men who are interested in power station operation and/or maintenance as a career.

Facilities are available whereby experience can be obtained in all sections of a large modern power station, and the prospects of advancement are real to those who are willing to take advantage of the opportunities.

The salary during the initial training period will depend on qualifications and knowledge, and will be within the range £625/£805 per annum of the National Joint Board Agreement.

Closing date for receipt of applications: 12 Nov., 1960.

GENERAL ASSISTANT ENGINEERS
(CHEMISTS)
SPONDON POWER STATION
Vacancy No. 249/60.

Applications are invited for the positions of General Assistant Engineers (Chemists) at Spondon Power Station, near Derby.

Candidates must have had a sound technical training and previous laboratory experience and should preferably hold the Higher National Certificate in Chemistry, but consideration will be given to candidates studying for that qualification.

The salary will be within the range £625/£805 per annum of the National Joint Board Agreement.

Closing date for receipt of applications: 12 Nov., 1960.

These appointments will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Station Superintendent concerned and should be returned to him by the date stated.

O. S. WOODS,
Divisional Controller.
(S 450)

CITY OF LIVERPOOL EDUCATION COMMITTEE

COLLEGE OF TECHNOLOGY

Byrom Street, Liverpool, 3

Principal: S. A. J. Parsons, B.SC.(ECON.), M.I.MECH.E., M.I.PROD.E., M.B.I.M.

DEPARTMENT OF ELECTRICAL ENGINEERING

APPLICATIONS are invited from suitably qualified persons for the appointment of TWO SENIOR LECTURERS in ELECTRICAL ENGINEERING (full-time).

(i) for HEAVY CURRENT, and
(ii) for LIGHT CURRENT work.

Salary: £1,550 x £50—£1,750 per annum (1959 Burnham Technical Report). Increments within the scale may be added to the commencing salary for approved industrial or professional experience or research work of an equivalent standard.

Applicants should have experience for (i) on electrical machines and electricity supply: and for (ii) in the field of electrical measurements and electronic engineering.

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An honours degree in electrical engineering is essential, an appropriate professional qualification is desirable, together with industrial and/or research experience. Teaching experience is desirable. Persons appointed would be encouraged to undertake research and would be expected to organise post-graduate courses.

Application forms (returnable by Nov. 18, 1960) and further particulars from H. S. Magnay, M.A., Director of Education, 14 Sir Thomas St, Liverpool 1. Please state which post is being applied for.

THOMAS ALKER,
Town Clerk and Clerk to the
Local Education Authority.
(S 441)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Nuclear Generating Station

APPLICATIONS are invited for a superannuable appointment as an

ASSISTANT SHIFT CHARGE ENGINEER

at the Board's Nuclear Generating Station which is being constructed at Hunterston, nr Largs, Ayrshire.

The successful applicant will be responsible for delegated duties while on shift in the operation of both nuclear and conventional plant. The minimum technical standard will be the possession of a Higher National Certificate. Previous experience in power station operation is essential. A course will be given on the operation of nuclear reactors.

Salary: N.J.B., Class M, Grade 8, £1,440/£1,610.

Applications, quoting reference No. G35/60, should be submitted on the standard form to the Secretary, South of Scotland Electricity Board, Inverlair Ave, Glasgow S.4, not later than Friday, 18 Nov., 1960. (S 448)

YORKSHIRE ELECTRICITY BOARD

Electronic Data Processing

APPLICATIONS are invited for superannuable appointments to the staff of the Chief Accountant to establish and operate in Leeds a large centralised electronic data processing system employing an English Electric KDP.10 computer with associated equipment.

The appointments are:

(1) ASSISTANT CHIEF ACCOUNTANT (N.J.M. GRADE C.7, £2,595/£2,815).

(2) ASSISTANT ACCOUNTANT (PLANNING) (N.J.M. GRADE C.4, £1,965/£2,170).

(3) ASSISTANT ACCOUNTANT (OPERATION) (N.J.M. GRADE C.3, £1,765/£1,965).

The duties of post (1) will be to take charge of the complete project, covering both planning and operation, and applicants should have had considerable experience of large-scale administrative reorganisation. Possession of a recognised accountancy or academic qualification and experience of electronic data processing will be advantageous.

The duties of post (2) will be to supervise the systems analysis and programming work and to organise the takeover of work from existing punched-card systems to the computer system. The duties of post (3) will be to operate the system including computer, magnetic tape stations, off-line equipment, punched-card machinery and administrative arrangements. Applicants should have had sound mathematical, accountancy or other related experience, but a knowledge of computer techniques is not essential, as appropriate training will be given.

Applications quoting ET6 should include the names of two referees and be sent to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds, to reach him not later than 14 days after the appearance of this advert. (S 440)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

SOUTH OF SCOTLAND ELECTRICITY BOARD

Edinburgh and Borders Area

THIRD ASSISTANT ENGINEER
BORDERS DISTRICT

SALARY: N.J.B., SCHEDULE A, CLASS F, GRADE 9, £890/£1,015

APPLICATIONS are invited for the appointment of a Third Assistant District Engineer in the Borders District, based on Berwick-upon-Tweed.

Conditions of service will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry and the successful candidate will, subject to satisfactory evidence of health, require to become a contributor to the Board's Superannuation Scheme.

Applicants should preferably possess the Higher National Certificate in Electrical Engineering or equivalent qualifications, and have experience in the planning, construction, operation and maintenance of High Voltage and Low Voltage Overhead and Underground Systems, and associated substation plant and equipment.

The successful applicant will require to reside within a reasonable distance of District Haedquarters.

Applications, on the standard form, obtainable from the undersigned should be submitted not later than 18 Nov., 1960.

C. H. A. COLLYNS,
Manager.

52 Melville St,
Edinburgh 3. (S 442)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Central Gloucestershire Sub-Area

THIRD ASSISTANT ENGINEERS (CONTROL) (TWO) (HEADQUARTERS)

The successful applicants will be required to take full shift responsibilities for all functions associated with high voltage system control. Applicants should have had sound technical training together with experience of switching operations and maintenance work on H.V. distribution equipment. Technical qualifications desirable.

Salary: £1,115/£1,245 per annum (N.J.B., Grade K10) plus 10% shift enhancement when on shift duty.

Apply, by letter, within 14 days, stating age, experience, qualifications, present position and salary to Mr S. Raybould, Sub-Area Manager, Midlands Electricity Board, Eastern Ave, Gloucester.

Wolverhampton & District Sub-Area

THIRD ASSISTANT DISTRICT ENGINEER (WALSALL)

Applicants should have had experience in the construction and Maintenance of high and medium voltage distribution systems. Technical qualifications desirable.

Salary: £965/£1,090 per annum (N.J.B., Grade G9).

GENERAL ASSISTANT DISTRICT ENGINEER (WALSALL)

Applicants should have had experience in the Electricity Supply Industry. Technical qualifications desirable. Salary within the ranges £715/£805, £765/£870 or £825/£940 per annum (N.J.B., Grades G13, 12 or 11), according to qualifications and experience.

GENERAL ASSISTANT DISTRICT ENGINEER (WOLVERHAMPTON)

Applicants should have had experience in the Electricity Supply Industry. Technical qualifications desirable. Salary within the ranges £765/£870, £825/£940 or £890/£1,015 per annum (N.J.B., Grades J14, 13 or 12), according to qualifications and experience.

Apply, by letter, stating age, qualifications, experience, present position and salary to Mr D. Holt, Sub-Area Manager, Midlands Electricity Board, 83 Darlington St, Wolverhampton.

Worcester & District Sub-Area

FIRST ASSISTANT DISTRICT ENGINEER (EVESHAM)

Experience necessary in all Branches of distribution work including construction, maintenance and operation of high and low voltage underground and overhead systems and substations. Technical qualifications

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desirable. Salary: £1,190/£1,325 per annum (N.J.B., Grade F5).

Apply, by letter, within 14 days, stating age, experience, present position and salary to Mr J. Johnston, District Manager, Midlands Electricity Board, 64 High St, Evesham.

WAYLEAVE OFFICER/SURVEYOR (HEADQUARTERS)

Duties include surveying, profiling, plotting of routes, and negotiation and preparation of Wayleave Agreements and Consents for Overhead Lines.

Salary: £780/£880 per annum (N.J.C., Grade 3).

Apply, by letter, within 14 days, stating age, experience, present position and salary to Mr R. Mallet, Sub-Area Manager, Midlands Electricity Board, P.O. Box No. 52, Blackpole Rd, Worcester.

F. W. CATER,
Secretary.
(S 444)

THE SOUTH WALES ELECTRICITY BOARD

SENIOR SHOWROOM ASSISTANT

APPLICATIONS are invited for the vacancy of Senior Showroom Assistant in our Showrooms at Mill St, Pontypridd.

Applicants must have experience in the use and application of domestic electrical apparatus, and in modern selling techniques and display.

Salary: N.J.C., Grade 2 (£700/£755). Superannuation, Sick Pay and Holiday Schemes.

Applications, stating age, present position, present salary, qualifications and experience should be addressed to C. L. Townsend, ASSOCIATE I.E.E., Manager, Cardiff and East Central Area, 445-447 Cowbridge Rd East, Cardiff, so as to arrive not later than 19 Nov., 1960. Please quote reference 149/60/ET, endorsing envelopes "Senior Showroom Assistant."

Previous applicants need not re-apply as their applications are still under consideration.

ASSISTANT ENGINEER

Applications are invited for the position of Assistant Engineer in the South Cardiganshire District (Cardigan) in the West Wales Area of the Board.

Salary: N.J.B., Class D, Grade 9, Scale 4 (£765/£870).

Applications stating age, present position, present salary, qualifications and experience should be addressed to W. E. Richardson, A.M.I.E.E., Manager, West Wales Area, South Beach Pavilion, Tenby, Pembs, to reach him not later than 19 Nov., 1960. Please quote reference 201/60/ET, endorsing envelopes "Assistant Engineer."

R. G. WILLIAMS,
Secretary.
(S 443)

THE NORTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER (TESTING)
WEST LAKELAND DISTRICT

APPLICANTS should be capable of inspecting, testing and commissioning all kinds of switchgear, transformers, etc., and particularly must have an intimate knowledge of protective systems.

Possession of the H.N.C. in Electrical Engineering would be an advantage.

Salary Scale: £965 x £25—£1,090 p.a. Grade G.9. N.J.B. Conditions.

Application forms to be obtained from the Manager, No. 6 Sub-Area, The North Western Electricity Board, Castle Green, Kendal, and returned to him by 14 Nov., 1960. (S 438)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS invited for the following superannuable N.J.B. Schedule A appointments in the South Wales Division:

USKMOUTH "B" POWER STATION
WEST NASH, NR. NEWPORT, MON.

SECOND ASSISTANT STATION CHEMIST
Vacancy No. 292/ET/60.

Salary: Class K, Grade 10, Scale 9, £1,115/£1,245 per annum.

Applicants should possess a Degree in Chemistry or equivalent; experience in water treatment, coal and oil testing and corrosion problems desirable.

USKMOUTH "A" POWER STATION
WEST NASH, NR. NEWPORT, MON.

THIRD ASSISTANT STATION CHEMIST
Vacancy No. 293/ET/60.

Salary: Class K, Grade 12, Scale 7, £965/£1,090 per annum.

Applicants should possess H.N.C. (Chemistry) or its equivalent and should have had experience in a modern Power Station.

ASSISTANT MAINTENANCE ENGINEER (M)
Vacancy No. 294/ET/60.
RE-ADVERTISEMENT

Salary: Class K, Grade 8, Scale 11, £1,275/£1,410 per annum.

Applicants should possess H.N.C. or equivalent qualifications, and have had operating experience in a modern Power Station.

Previous applicants need not re-apply.

ASSISTANT SHIFT CHARGE ENGINEER
Vacancy No. 295/ET/60.

Salary: Class K, Grade 8, Scale 11, £1,275/£1,410 per annum, plus 10% shift enhancement.

Applicants should possess H.N.C. or equivalent qualifications, and have had operating experience in a modern Power Station.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 18 Nov., 1960. (S 477)

SOUTH EASTERN ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT ENGINEER
KINGSTON DISTRICT

SALARY under N.J.B., Class G, Grade 5, £1,275/£1,410 p.a. with progression to Grade 4 (maximum salary £1,500) subject to satisfactory service, plus London Weighting. Superannuable. Reclassification is probable from April, 1961. Consideration will be given to a car allowance and assistance with house purchase. The successful applicant will be required to assist the District Engineer in all the work of a distribution department, and must have had a wide experience of all aspects of distribution engineering and, in particular, planning, construction and the control of staff. Applicants should be suitably qualified and preferably Corporate Members of the I.E.E.

Applications, quoting ET and naming two referees, on forms from District Manager, Seeboard, 22 Claremont Rd, Surbiton, Surrey, by 16 Nov., 1960.

GEORGE WRAY,
Secretary.
(S 457)

LONDON ELECTRICITY BOARD

ASSISTANT DISTRIBUTION ENGINEER

APPLICATIONS are invited for the above position in the Board's Surrey Suburban District, Durnsford Rd, Wimbledon, S.W.19.

Applicants should have a sound technical education to the standard of the Higher National Certificate and possess practical experience of engineering work associated with the organisation of a District distribution department.

The post is graded under Schedule A of the National Joint Board Agreement as Class H, Grade 12, £875 per annum rising to £990 per annum, inclusive of London Allowance.

Applications should be sent direct to the Manager, at the above address, within 14 days of the publication date of this notice, quoting ref.: PER/V/3123/T. (S 471)

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

ASSISTANT CHEMIST
DIVISIONAL LABORATORY
Vacancy No. 246/60.

APPLICATIONS are invited for the position of Assistant Chemist in the Divisional Laboratory at North Wilford Power Station, Queen's Drive, Nottingham.

Candidates should be capable of initiating and leading investigations into one or more of the following topics: Air Pollution, River Pollution, Industrial Water Treatment, Analytical Method Development, and should have a sound knowledge of inorganic analysis.

Candidates should hold a degree or equivalent professional qualification. Previous power station experience is advantageous although not essential.

Salary will be in accordance with Class BX, Grade 8 (£1,105/£1,410 per annum), of the National Joint Board Agreement, and the position will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Establishments Officer, P.O. Box 25, Barker Gate, Nottingham, and should be returned to him not later than 19 Nov., 1960.

THIRD ASSISTANT ENGINEER
TECHNICAL DEPARTMENT
DIVISIONAL HEADQUARTERS
Vacancy No. 251/60.

Applications are invited for the position of Third Assistant Engineer in the Technical Department at Divisional Headquarters, Nottingham.

The minimum technical qualification desired is the Higher National Certificate in Electrical Engineering and preference will be given to candidates who have completed a recognised post-graduate apprenticeship.

Experience in the commissioning of high voltage switchgear and protective gear is essential. Experience in the associated contract engineering work is desirable.

Salary will be in accordance with Class BX, Grade 6 (£1,285/£1,610 per annum), of the National Joint Board Agreement, and the position will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Establishments Officer, P.O. Box 25, Barker Gate, Nottingham, and should be returned to him not later than 19 Nov., 1960.

O. S. WOODS,
Divisional Controller.

27 Oct., 1960. (S 449)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern and Yorkshire Region

APPOINTMENT AS FOURTH ASSISTANT ENGINEER (CLERK OF WORKS)
GENERATION DEPARTMENT
NORTH EASTERN DIVISION

APPLICATIONS are invited for the appointment of a Fourth Assistant Engineer (Clerk of Works) in the Generation Department, Newcastle upon Tyne.

Applicants should have had a wide experience in the supervision of building and civil engineering trades, the interpretation of drawings and contract documents and be fully conversant with modern buildings and construction techniques. Duties will include the carrying out of surveys, setting out of works and agreeing site measurements.

Candidates should possess, as a minimum, an Ordinary National or City and Guilds Certificate in Building, or have equivalent qualifications.

The salary for the appointment, which is superannuable, will be in accordance with the National Joint Board Agreement, Grade 9, Schedule B (£1,005/£1,245 per annum) and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 15 Nov., 1960. (S 474)

UGANDA ELECTRICITY BOARD

THE Board requires

ASSISTANT ELECTRICAL ENGINEERS

to participate in the interesting work of electrical development in the Protectorate.

Uganda has a very pleasant climate and income tax is lower than in the United Kingdom. Passages for employee and family, partly furnished accommodation, medical and dental treatment all free. Five days' overseas leave for every completed month of service in East Africa, plus local leave. Normal tour of duty, 24-36 months.

Applicants should be Corporate Members of the Institution of Electrical Engineers or should have technical qualifications leading to that status.

Some experience in the construction and/or operation and maintenance of an electricity supply network, including overhead lines and substations with voltages up to 33 kV is essential. Experience at higher voltages is desirable.

Commencing salary depending upon qualifications and experience within the scale 1,265 x £35—£1,580 per annum. In addition a monthly gratuity of 30% of salary will be paid.

SECONDMENT

Persons serving in the United Kingdom Electricity Industry may be seconded to Uganda for periods of up to two years without loss of pension or other rights with the approval of their employing authority. Annual leave entitlement for seconded personnel is six weeks.

Application forms and further information on Uganda and the Uganda Electricity Board may be obtained from the London Representative, Uganda Electricity Board, Uganda Hse, Trafalgar Sq, London W.C.2, to whom completed forms should be returned not later than 25 Nov., 1960.

E. H. WILSON,
Secretary.
(S 463)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area

HEMEL HEMPSTEAD DISTRICT
TWO FOURTH ASSISTANT ENGINEERS
284/60.R.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, including substations.

Salary: N.J.B., Class F, Grade 11 (£765/£870).

Apply by letter to the Manager, Hemel Hempstead District, Eastern Electricity Board, Bridge St, Hemel Hempstead, Herts., by 18 Nov., 1960.

Northmet Sub-Area

THIRD ASSISTANT ENGINEERS
(A) HENDON DISTRICT (REF. 1011)
287/60.R.
(B) ST. ALBANS DISTRICT—TWO POSTS
(REF. 975 AND 987)
286/60.R.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary: N.J.B., Class G, Grade 9 (£965/£1,090), plus London Allowance for post (a).

Apply by letter, by 14 Nov., 1960, to: (a) F. A. Moinet, M.I.E.E., Eastern Electricity Board, Northmet Sub-Area, 137-139 Brent St, Hendon. (b) F. J. Drake, ASSOCIATE I.E.E., Manager, Eastern Electricity Board, 107 St. Peter's St, St. Albans.

HENDON DISTRICT
FIRST ASSISTANT DISTRICT ENGINEER
(REF. 1010)
285/60.R.

Applicants should have had a sound training in electrical engineering and considerable experience in the design, construction, operation and maintenance of underground distribution systems, including substations, up to and including 33 kV. Corporate Membership of the Institution of Electrical Engineers will be an advantage.

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Salary: N.J.B., Class G, Grade 5 (£1,275/£1,410), plus London Allowance.

Apply by letter to F. A. Moinet, M.I.E.E., Manager, Eastern Electricity Board, 137-139 Brent St, N.W.4, by 14 Nov., 1960.

Sub-Area Headquarters, London N.14.

GENERAL ASSISTANT ENGINEER
(SENIOR DRAUGHTSMAN)
CIVIL ENGINEERING AND BUILDING
SECTION, SUB-AREA ENGINEER'S DEPT.
(REF. 1012)
288/60.R.

The successful candidate will be responsible for the preparation of drawings for building and civil engineering work for 11 and 33 kV substations, offices, showrooms and workshops, etc., and should be capable of carrying out site surveys and supervising drawing office staff.

Possession of the Ordinary National Certificate (Building) or equivalent qualification will be an advantage.

Salary: N.J.B., Class N, Grade 15 (£1,015/£1,140), inclusive of London Allowance.

Apply by letter to the Manager, Eastern Electricity Board, Northmet Sub-Area, Northmet Hse, Southgate, London N.14, by 21 Nov., 1960. (S 475)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

ASSISTANT ENGINEER
(DIVISIONAL HEADQUARTERS)

FOURTH Assistant Engineer required in Electrical Department at Divisional Headquarters.

N.J.B. Agreement conditions. Superannuable appointment salary within Schedule B, Class BX, either Grade 9, 10 or 11, according to qualifications and experience. The salary ranges are as follows:

Grade 9: £1,005/£1,325 per annum.
Grade 10: £935/£1,245 per annum.
Grade 11: £855/£1,165 per annum.

Candidates should possess a Higher National Certificate in Electrical Engineering or an equivalent qualification and should have had some experience on equipment associated with E.H.V. transmission equipment, e.g., switchgear transformers or overhead line. Previous applicants for this position will be reconsidered and need not reapply.

Apply, quoting Vacancy No. 299/60MD, on form AE6 available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, to reach him not later than 14 Nov., 1960. (S 459)

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for the following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule B. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

THIRD ASSISTANT ENGINEER
ELECTRICAL DEPARTMENT
ISLINGTON POWER STATION
Vacancy No. 60/884.

The successful candidate will take charge of a workshop and team of Electrical Fitters engaged on installation work in grid substations and generating stations. Candidates should have a thorough experience of electrical installation work with particular reference to wiring of control and relay panels. Salary: Class BX, Grade 8, from 1 July, 1960, £1,155/£1,460; from 1 July, 1961, £1,195/£1,460 per annum.

Applications, quoting vacancy number, may be made (on the standard form) or to Personnel Officer, Central Electricity Generating Board, London Division, P.O. Box 136, London W.1, by 15 Nov., 1960. (S 439)

THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

Area Board Headquarters

Chief Engineer's Department. Carliol House

Newcastle upon Tyne

THIRD ASSISTANT ENGINEER
CONSTRUCTION SECTION

Applicants should have had experience in design and testing of transformers and regulators. Duties will include the specification and checking of drawings, including tap change control diagrams.

Salary: Schedule B, Grade AX8/AX7, £1,105/£1,410, according to experience. N.J.B. conditions.

Wear Sub-Area

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER
STANLEY SERVICE CENTRE

Applicants should preferably be graduate or corporate members of I.E.E. or possess equivalent qualifications in electrical engineering, and have experience in utilisation of electrical energy in commercial and domestic premises, knowledge of installation work and be conversant with tariffs, sales and all aspects of consumers' service.

Salary: Schedule A, Class F, Grade 5, £1,190/£1,325. N.J.B. conditions.

SENIOR DEMONSTRATOR AT SUNDERLAND

Applicants should have a certificate of a recognised Domestic Training College and/or E.A.W. certificate, preferably the latter; also considerable experience as a Demonstrator in the Electricity Supply Industry.

Salary: Grade 2, £700/£755 according to qualifications and experience. N.J.C. conditions.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne, within ten days of the appearance of this advertisement. (S 446)

City and County of Norwich

ASSISTANT ELECTRICAL ENGINEER

REQUIRED. Salary: APT Grade III (£935/£1,140) or the Special Grade (£840/£1,145) with casual car allowance, according to experience and qualifications. Applicants must have the Higher National Certificate or be Graduates of the Institution of Electrical Engineers, have served an apprenticeship in electrical installation work and have had experience in the design and supervision of street lighting, and interior lighting and power installations.

Applicants should state age, qualifications, training, experience, present and previous positions, giving salaries and dates, together with names of three referees.

Applications to the City Engineer, City Hall, Norwich, NOR 01A, by 17 Nov., 1960. (S 476)

LONDON ELECTRICITY BOARD

SENIOR DRAUGHTSMAN

APPLICATIONS are invited for the above position in the Board's South Western District, 204 Lavender Hill, S.W.11.

Candidates should have had a good general and technical education, possess the Ordinary National Certificate in Building or its equivalent, and be capable of supervising Engineering Draughtsmen and other Drawing Office staff. They must be capable of preparing drawings and structural calculations for building and reinforced concrete work mainly associated with the construction of Transformer Chambers within new and existing buildings.

Pending determination as to the grading of the post within Schedule A of the National Joint Board Agreement, the salary will be in the provisional range £940 per annum rising to £1,065 per annum inclusive of London Allowance.

Application form obtainable from the Personnel Officer, 46 New Broad St, E.C.2, to be returned completed within 14 days of the publication date of this notice. Please quote ref.: PER/V/3131/T. (S 470)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Lanarkshire Area

(1) APPOINTMENT OF THIRD ASSISTANT DISTRICT ENGINEER
MOTHERWELL DISTRICT

(2) APPOINTMENT OF THIRD ASSISTANT DISTRICT ENGINEER
RUTHERGLEN DISTRICT

(3) APPOINTMENT OF GENERAL ASSISTANT DISTRICT ENGINEER
RUTHERGLEN DISTRICT

APPLICATIONS are invited for the above appointments. Applicants should have had a sound engineering and technical training and preferably be Graduates of the Institution of Electrical Engineers or hold equivalent qualifications.

The salary and conditions of service for these appointments will be in accordance with the National Joint Board Agreement. The posts will be superannuable.

Applicants for these appointments should have had some experience in the maintenance and operation of H.V. and L.V. overhead and underground networks and be conversant with load-flow diagrams and voltage drop and short-circuit calculations.

It is a condition of these appointments that the successful candidates take stand-by duty in accordance with the above agreement and reside within a reasonable distance of their respective District Offices.

Present classification and gradings are as follows:

Appointments 1 and 2: G.9 (Scale 7), salary £965/£1,090.

Appointment 3: G.11 (Scale 5), salary £825/£940.

Application forms, which may be obtained from the undersigned, should be returned to this office within 14 days of the date of this advertisement.

R. J. RENNIE,
Manager.

Montrose Cres,
Hamilton. (S 467)

THE NORTH WESTERN ELECTRICITY BOARD

FOURTH ASSISTANT DISTRICT ENGINEER
(DRAWING OFFICE)
LEIGH DISTRICT

APPLICANTS should be familiar with the preparation of building drawings, electrical engineering diagrams and mains records. They should also have had a technical education and drawing office training. Possession of appropriate H.N.C. is desirable.

Salary Scale: £825/£940 p.a. Grade J.13. N.J.B. Conditions.

SENIOR DEMONSTRATOR
WIGAN DISTRICT

Applicants must have had a good education with training in domestic science and should hold the E.A.W. Diploma. The person appointed will be required to give lectures and demonstrations on all types of domestic appliances, advise consumers on the choice of equipment and must be capable of supervising staff.

Salary Scale: £700 x £25—£755 p.a. Grade 2. N.J.C. Conditions.

Applications on forms to be obtained from the Manager, No. 2 Sub-Area, The North Western Electricity Board, 2 St. George's Rd, Bolton, and returned to him by 14 Nov., 1960. (S 432)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

FOURTH ASSISTANT ENGINEER
(TELECOMMUNICATIONS, TECHNICAL DEPT.)

APPLICATIONS are invited for the above appointment for which a vacancy exists in the Reading and Melksham area.

Duties will include the installation and maintenance of automatic telephone type equipment, including applications in telephony, supervisory and remote control systems. Knowledge of V.F. line signalling technique and acquaintance with electronic or V.H.F. radio would be an advantage.

Technical qualification to Graduate standard of an appropriate institution desirable.

Salary: N.J.B. A.X. 11, £855/£1,090.

Special application forms obtainable only from Divisional Secretary, 111 High St, Portsmouth, should be returned by 15 Nov., 1960. (S 486)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following positions:

THIRD ASSISTANT DISTRICT ENGINEER
(PLANNING)
WEST CORNWALL

Salary according to Class G, Grade 9, Salary Scale 7, £965/£1,090 per annum, of the N.J.B. Agreement.

The successful candidate will be required to assist in the planning work of a large, mainly rural, distribution system, together with the preparation of capital applications and estimates. The person appointed will be required to undertake standby duties.

A sound knowledge of construction methods and of all types of plant and equipment is necessary. Possession of the Higher National Certificate in Electrical Engineering is desirable, and possession of a current driving licence will be an advantage.

Applications for the above post to be made on standard form AE6/ACT, OBTAINABLE BY POSTCARD ONLY, from the District Manager, South Western Electricity Board, 13 Basset Rd, Camborne. Closing date for receipt of completed applications is 19 Nov., 1960.

THIRD ASSISTANT ENGINEER (PLANNING)
SOMERSET GROUP

Salary according to Class J, Grade 10, Salary Scale 8, £1,040/£1,165 per annum, of the N.J.B. Agreement.

The successful candidate will be required to assist generally in the Group Engineering Department, including assistance with the planning, preparation and examination of schemes for reinforcement of and extensions to the overhead and underground network up to and including 33 kV.

Applicants should possess as a minimum qualification the Higher National Certificate in Electrical Engineering or equivalent.

Applications for the above post to be made on standard form AE6/ACT, OBTAINABLE BY POSTCARD ONLY, from the Group Administrative Officer, South Western Electricity Board, The Parade, Taunton. Closing date for receipt of completed applications is 19 Nov., 1960. (S 464)

YORKSHIRE ELECTRICITY BOARD

No. 3 (Sheffield) Sub-Area

THIRD ASSISTANT ENGINEER
(DISTRIBUTION DESIGN)

APPLICANTS should hold qualifications leading to Associate Membership of the Institution of Electrical Engineers and have had a sound practical training with subsequent experience in electricity supply or with an electrical manufacturer.

Salary: N.J.C., Class N, Grade 10 (Scale 12), £1,350/£1,500 per annum.

Applications, together with the names of two referees, should be returned to the Manager, Yorkshire Electricity Board, No. 3 (Sheffield) Sub-Area, Commercial St, Sheffield, not later than 18 Nov., 1960. (S 472)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

No. 4 Sub-Area

DEMONSTRATOR

REQUIRED in the Wrexham District of the Board's No. 4 Sub-Area. Salary within the range £600/£700 per annum (N.J.C. Grade 1).

Candidates should have a good knowledge of electrical appliances, should be experienced demonstrators and be competent to give demonstrations of cooking, laundering and housecraft subjects. The possession of a recognised Diploma in Domestic Science or other approved certificate desirable.

Possession of a valid motor vehicle driving licence would be an advantage.

Appointment subject to medical examination. Pension Scheme.

Standard application forms should be submitted to the Manager, No. 4 Sub-Area, Rhostyllen, nr. Wrexham, or from any District Office.

Closing date: 14 Nov., 1960.

Applicants in respect of previous advertisement need not re-apply. (S 466)

SOUTHERN ELECTRICITY BOARD

METER ENGINEER
(Z.1275)

SUB-AREA Office of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class M, Grade 5 (£1,795/£1,950 per annum). N.J.B. Conditions of Service.

The successful candidate will be responsible to the Sub-Area Engineer for the administration and control of the Sub-Area Meter Testing Station and to supervise all meter work throughout the Sub-Area. Candidates should be Corporate Members of the I.E.E. or possess equivalent qualifications. They must have a sound knowledge of all matters relating to meter engineering, including statutory requirements, and must be fully experienced in the operation of modern Class A Stations dealing with all types of A.C. and D.C. meters, demand indicators, instruments, time switches, instrument transformers and protective relays.

ASSISTANT ENGINEERS
(MAINTENANCE AND OPERATION)
(Z.1271)

(a) Reading District and (b) Oxford District of No. 2 (Newbury) Sub-Area. Salary in each case: N.J.B. Class J, Grade 9 (£1,115/£1,245 per annum). N.J.B. Conditions of Service.

The duties of the posts will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations with particular reference to the preparation of technical data relating to system operation. A technical training to H.N.C. standard and experience of similar work are required. A regular users' car allowance will be available.

ASSISTANT ENGINEER
(MAINTENANCE AND OPERATION)
(Z.1272)

Oxford District of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class J, Grade 9 (£1,115/£1,245 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist with the maintenance and operation of H.V. and L.V. distribution mains and substations and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required. A regular users' car allowance will be available.

Applications for these appointments on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting the appropriate "Z" number, not later than 14 Nov., 1960.

TRANSPORT OFFICER

Sub-Area Office of No. 4 (Bournemouth) Sub-Area. Salary: N.J.C. Grade 5 (£1,020/£1,140 per annum). N.J.C. Conditions of Service.

The successful candidate will be responsible to the Sub-Area Secretary for the coordination, maintenance and administration of a mixed, decentralised fleet of, at present, approximately 425 vehicles.

Applicants must have had experience in the maintenance of road transport (preferably with a Public Utility in Great Britain) with particular reference to the control and maintenance of vehicles and mobile plant. A knowledge of road transport legislation and familiarity with modern vehicle costing methods, as well as administrative ability, are essential qualifications.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him, quoting Z.1274, not later than 14 Nov., 1960.

ASSISTANT ENGINEER (PLANNING)

Swindon District of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class G, Grade 10 (£890/£1,015 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist the Planning Engineer in the preparation of schemes and estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks, and to undertake standby duties if required. Applicants should possess suitable technical qualifications.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1234, not later than 14 Nov., 1960.

continued in next column

continued from previous column

GENERAL ASSISTANT ENGINEER

Southampton District of No. 4 (Bournemouth) Sub-Area. Salary: N.J.B. Class H, Grade 11 (£890/£1,015 per annum). N.J.B. Conditions of Service.

The successful candidate will be required to give general assistance in the preparation of schemes and estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks. Applicants should have had sound experience in Electricity Supply Distribution, and the possession of suitable technical qualifications would be an advantage. The successful candidate will be required to carry out standby duties if and when called upon to do so.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him, quoting Z.1273, not later than 14 Nov., 1960.

AGRICULTURAL REPRESENTATIVE

Swindon District of No. 2 (Newbury) Sub-Area. Salary: N.J.C. Grade 3 (£780/£880 per annum). N.J.C. Conditions of Service.

Applicants should have a sound knowledge of the applications of electricity in Agriculture and Horticulture, be capable of preparing estimates; conducting negotiations and obtaining new business. Ability to give talks to agricultural organisations will be an advantage.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1259, not later than 14 Nov., 1960.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. (S 465)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

Croydon 'A' & 'B' Generating Stations

Vacancy No. 223/60T.

APPLICATIONS are invited for the position of

SECOND ASSISTANT CHEMIST

Croydon "A" and "B" Generating Stations.

Candidates should be familiar with the methods of sampling and analysis of coal, water and oil, together with the interpretation and application of analytical results in respect of power plant operation. Preference will be given to candidates having previous Power Station experience with a minimum qualification of H.N.C. (Chemistry).

Salary in accordance with N.J.B., Class K, Grade 11, £1,090/£1,215 per annum, including London Allowance.

Applications giving age, details of qualifications, experience, etc., and quoting vacancy number, should be sent to the Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey, to arrive by 16 Nov., 1960.

W. H. DUNKLEY,
Divisional Controller.
(S 455)

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

Vacancy No. ET/AV/153/60.

STATION SHIFT CONTROL ENGINEER

REQUIRED at Bath Power Station. Superannuation Scheme. Salary: N.J.B. Class D, Grade 10, Scale 3, £715/£805 per annum, plus 10% Shift Allowance.

Vacancy No. ET/AV/154/60.

ASSISTANT SHIFT CHARGE ENGINEER

Required at Plymouth "A" Power Station. Superannuation Scheme. Salary: N.J.B. Class F, Grade 9, Scale 6, £890/£1,015 per annum, plus 10% Shift Allowance.

Applicants should possess good technical qualifications and have had training and experience in the control and operation of modern steam generating plant and main switchgear.

Applications on form AE6/ACT, obtainable from the Divisional Secretary, 26 Oakfield Rd, Clifton, Bristol 8, should be completed and returned by 14 Nov., 1960.
(S 458)

NEW ZEALAND—NAVY DEPARTMENT

Vacancy No. 3022.
ELECTRICAL DRAUGHTSMAN

VACANCIES exist for Electrical Draughtsmen in H.M.N.Z. Dockyard, Auckland.

SALARY: Commencing salary will be determined according to qualifications and experience with prospects of advancement to £1,120 per annum on merit.

QUALIFICATIONS DESIRED: Good schooling with experience in Admiralty Naval Dockyards or Shipyards. Housing is available for a married man for a period of 12 months.

Passages

Steamer fares of up to £165 each for the appointee and his wife, and pro rata for dependent children will be paid.

Incidental Expenses

Up to £35 for a single person and £100 for a married man can be claimed to cover the cost of taking personal effects to New Zealand.

Application forms and further details are available from the High Commissioner for New Zealand, 415 Strand, London W.C.2, with whom applications will close on 29 Dec., 1960. (S 462)

ASSISTANT ELECTRICAL ENGINEER required by National Newspaper. Age 23-28. Electrical apprenticeship and Higher National. Must be first class electrical draughtsman. Good prospects. Box No. 8041, Electrical Times. (S 316)

BRITISH Engine Boiler and Electrical Insurance Co. Ltd., Longridge Hse, Manchester 4. ELECTRICAL SURVEYOR required in Scotland, also in Manchester. Permanent position carrying progressive salary scale £800/£1,100 and non-contributory pension. Candidates aged between 26 and 32, with H.N.C. in Electrical Engineering or Grad. I.E.E. and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply stating age, qualifications and experience. (S 478)

CONSULTING Engineer requires for Dublin Office DESIGN ENGINEER for electrical services in large buildings. Applicants must have at least four years' experience. Reply in confidence to Varming and Mulcahy, 4 Northbrook Rd, Dublin, giving details of experience, age, qualifications and salary expected. (S 373)

MIDDLE EAST

ELECTRICAL TECHNICIANS

Two required for industrial electrical plant maintenance. Must have thorough practical experience of this type of work which involves a wide range of H.T. and L.T. rotating plant and associated switch and control gear. Ability to trouble shoot accurately and quickly. Will be required to control local skilled labour in course of duties.

Full trade apprenticeship and at least five years subsequently in position of responsibility on industrial electrical maintenance. Initial contract three years, subject to satisfactory medical, six weeks' paid leave every 18 months. Free furnished bachelor accommodation first tour. Gross salary not less than £1,700 per annum, tax free.

Reply by Nov. 13 to Box 8061, Electrical Times. (S 433)

Ferranti transformers

Vacancies exist for

SENIOR & JUNIOR TRANSFORMER DESIGNERS

DEVELOPMENT ENGINEERS · DRAUGHTSMEN

in the Manchester branches of the Company

Necessary qualifications are:-

FOR DESIGN AND DEVELOPMENT

applications will be considered from holders of honours or pass degrees in Electrical Engineering or Physics, or of H.N.C. in Electrical Engineering. For Senior Design vacancies previous experience of transformer design is desirable.

FOR DRAWING OFFICE

H.N.C. in Mechanical Engineering is desirable and experience of transformer work or of the design of welded structures would be an advantage.

These vacancies offer EXCELLENT PROSPECTS AND HIGH TECHNICAL INTEREST. Successful candidates will be joining the foremost British transformer manufacturing company, with advantages of:-

- THE MOST UP-TO-DATE DESIGN AND DEVELOPMENT FACILITIES
- TECHNICAL LEADERSHIP
- A MANUFACTURING CAPACITY OF OVER 5,000,000 kVA PER ANNUM
- WORLD-WIDE INTERESTS

They will have the opportunity of being associated with activities such as:-

The recent order for one of the first two 380 kV 400 MVA transformers for the C.E.G.B., the almost completed contract for the 330kV transmission transformers for the Kariba Dam Scheme etc.

The use of high voltage equipment such as 4,000,000 Volt and 1,500,000 Volt impulse generators, a Pegasus 2 computer etc.

MAJOR CONTRACTS IN TRANSFORMERS AND HIGH VOLTAGE EQUIPMENT IN 5 CONTINENTS.

Applicants should send brief details of their qualifications and experience to:-

T. J. LUNT, Staff Manager
Ferranti Ltd., Hollinwood, Lancs.
and quote reference FWG

Interviews will take place shortly and may be arranged for Saturday, if requested.

(S 469)

RHOKANA CORPORATION LIMITED

Northern Rhodesia

SECTIONAL ENGINEER — ELECTRICAL

Applications are invited from suitably qualified candidates for a position as Sectional Engineer—Electrical, with Rhokana Corporation Limited in Northern Rhodesia.

The successful applicant should be not less than 25 years of age and have had general experience in testing, commissioning and maintaining of electronic and light current devices and control circuits associated with the control of processes as applied to heavy industrial and mining requirements.

He must also be capable of developing, as and when the need arises, new electronic and light current control devices with a minimum of supervision, and be capable of applying and commissioning such developments for use in heavy industrial and mining work.

Salary will be commensurate with qualifications and experience, but in any event will not be less than £141 1s 6d per month, plus a variable cost of living allowance which at present is approximately £5 per month.

Conditions of employment include married/single accommodation at subeconomic rental, medical scheme, pension and life assurance schemes and participation in the metal bonus scheme, which at present is approximately 30% of annual earnings.

Applications in writing, stating qualifications, experience, age and marital status should be addressed by air mail to:

The Personnel Manager,
Rhokana Corporation Limited,
P.O. Box 2000,
Kitwe,
Northern Rhodesia.

(S 436)

CHARGE-HAND ELECTRICIAN required, with contracting experience. Able to lay out work on own initiative. Excellent prospects for right man. Write Box E.T. 828, c/o Hanway Hse, Clark's Pl, E.C.2. (S 487)

CONSULTING ENGINEERS require ASSISTANT ELECTRICAL ENGINEERS graduates with three/four years suitable experience on E.H.V. Transmission for (a) Contract Engineer, Weybridge, Surrey. (b) Site Supervision, North West England. Ref.: CMM. Kennedy Donkin, 12 Caxton St, Westminster, S.W.1. (S 488)

CABLE ENGINEER required at works in S.E. London to assist in the design of super tension, including oil-filled cables. Previous experience in this field is desirable and applicants should be of at least H.N.C. standard. Good salary according to qualifications and experience in a position that offers excellent prospects in an expanding organisation.

Please write with full details to Box 8063, Electrical Times. (S 453)

DRAUGHTSMAN required for Controls Section of large Mechanical Engineering Co. for panel layout and circuit work associated with automatic control schemes. Knowledge of electrical controls required. Experience in instrument and/or hydraulic schemes an advantage. O.N.C. preferred. Permanent and progressive position, pension and bonus schemes in operation.—Apply in writing to the Electrical Engineer, Black-Clawson International Ltd., 18/19 Savile Row, London W.1. (S 451)

DESIGN ENGINEER required for Consulting Engineer's Office to undertake the design of electrical services for all classes of buildings, including hospitals, industrial and commercial buildings, at home and abroad. Spring and summer holidays. Pension scheme and luncheon vouchers. Apply in writing, stating age, experience, present salary and salary required to: J. Roger Preston and Partners, 15 North Audley St, London W.1. (S 483)

TO

ELECTRICAL ENGINEERS

Interested in Sales Work

We offer a Career as a

SALES ENGINEER

A vacancy exists in our organisation for an engineer who is keen to develop a career in a section dealing with inside sales and design work. This post offers you the opportunity to obtain extensive experience in the following fields:

METAL RECTIFIERS, TRANSFORMERS, D.C. POWER SUPPLY AND BATTERY CHARGING EQUIPMENT.

If you satisfy the following requirements why not write to us?

Sound engineering background.
Technical qualifications to above H.N.C. level.
Experience in a design or sales section.

A comprehensive training, and a salary commensurate with ability, will be given to the successful applicant.

Write, without delay, to ELECTRO-AUTOMAT LTD., SWINTON, NEAR MANCHESTER, giving full details of your career. Please quote reference SE/ET/MJP.

(S 481)

ADMIRALTY—NAVY WORKS DEPARTMENT

ELECTRICAL AND MECHANICAL ENGINEERING DRAUGHTSMEN

Vacancies exist in Navy Works Department Drawing Offices as shown below and occur at Establishments elsewhere in United Kingdom from time to time.

The posts are non-pensionable but there will be opportunities for transfer to the Established staff.

Applicants must be competent Draughtsmen and experienced in one or more of the following types of work:

Electrical (Vacancies at Pinner (Middx.), Portland and Devonport).

(a) Preparation of specifications, drawings and schedules for electrical equipment. Précis of Firms tenders.
(b) Electrical installations in domestic and industrial buildings.
(c) Cable installations, switchgear, etc.
(d) Airfield lighting.

Mechanical (Vacancies at Pinner (Middx.), Portsmouth, Portland, Liverpool, Rosyth, London).

(a) Preparation of specifications, drawings, schedules and précis of Firms tenders.
(b) District heating, including boiler installations, heating and air conditioning of domestic and specialist buildings.
(c) Layouts of engineering installations and workshop machinery.
(d) All classes of lifting appliances, pumping installations, test plants, cooking equipment, etc.

Possession of O.N.C. or similar qualification will be an advantage. Consideration will be given to successful candidates being granted assistance to obtain technical qualifications.

Salary (Men): National Rate—subject to slight variation dependent on location: starting from £580 (at age 21) to £870 (28 and over); maximum of scale: £955 p.a. (National Rate).

Opportunities occur for promotion to Leading grade—salary maximum: £1,115 p.a. (National Rate).

Five-day week. Annual leave 18 days, rising to 22 after 10 years.

Candidates, who must be British subjects, are invited to apply in writing, giving details of qualifications and experience to Director General, Navy Works, Admiralty, Chamberlain Way, Pinner, Middlesex. (S 435)

DRAUGHTSMAN, Electrical, with experience in switchboard and fusegear design. A.E.S.D. rate and superannuation. Write stating full particulars to Arctic Fuse and Elec. Mfg. Co. Ltd., Birtley, Co. Durham. (S 430)

ELECTRICAL ENGINEER required for Glasgow Office staff, age 23-28. Applicants (H.N.C. minimum) should have had experience in the manufacture of electrical machines. Progressive salary with non-contributory pension. Applications stating age, nationality, qualifications and experience to British Engine Boiler and Electrical Insurance Co. Ltd., 98 West George St, Glasgow C.2. (S 479)

ELECTRICAL DRAUGHTSMAN required for Consulting Engineer's Office to assist in the preparation and design of electrical services for all classes of buildings, including hospitals, industrial and commercial buildings, at home and abroad. Spring and summer holidays. Pension scheme and luncheon vouchers. Apply in writing, stating age, experience, present salary and salary required to: J. Roger Preston and Partners, 15 North Audley St, London W.1. (S 484)

NEW ZEALAND
MINISTRY OF WORKS

The New Zealand Government Ministry of Works invites applications for Permanent Staff appointments. Positions available are:

CIVIL ENGINEERS

Qualifications: Corporate membership of the Institution of Civil Engineers, London. Commencing salaries from £985/£1,700 p.a.

ASSISTANT CIVIL ENGINEERS

Qualifications: A University Degree in Civil Engineering which gives exemption from Final Parts I and II of the A.M.I.C.E. examination; or other qualifications exempting from Parts I and II of A.M.I.C.E., plus at least five years' appropriate experience. Commencing salaries from £900/£1,120 p.a.

MECHANICAL AND ELECTRICAL ENGINEERS (AND ASSISTANTS)

Qualifications: Corporate membership of the Institutions of Mechanical or Electrical Engineers, London, or for Assistants a University Degree in Mechanical or Electrical Engineering or Graduate Membership of the above Institutions. Commencing salaries for Engineers £985/£1,700, and for Assistants up to £1,120 p.a.

BUILDING SERVICES ENGINEERS (AND ASSISTANTS)

Qualifications: Corporate membership of the Institution of Mechanical Engineers or of the Institution of Heating and Ventilating Engineers, London, or for Assistants a University Degree in mechanical engineering or Graduate membership of the above Institutions. Commencing salaries for Engineers, depending on experience, £985/£1,700, and for Assistants up to £1,120 p.a.

DRAUGHTSMEN—CIVIL AND STRUCTURAL

Qualifications: Ordinary or Higher National Certificates or the final examination of the City and Guilds, London, or Associate Membership of the Institution of Structural Engineers are desirable, but primary requirement is for skilled and speedy draughtsmen with substantial experience at the drawing board and in the types of civil engineering work designed by the Ministry of Works. Commencing salary up to £1,120 p.a.

DRAUGHTSMEN—MECHANICAL, ELECTRICAL AND BUILDING SERVICES

Qualifications: Ordinary or Higher National Certificate in Mechanical or Electrical Engineering or equivalent examination, and at least three years' experience in draughting, design and calculations. Commencing salaries up to £1,120 p.a.

QUANTITY SURVEYORS AND ASSISTANT QUANTITY SURVEYORS

Qualifications: Quantity Surveyors must be Associates of the Royal Institute of Chartered Surveyors or the Quantity Surveyors' Institute. Assistant Quantity Surveyors should have passed the intermediate sections of those examinations.

For both positions experience is required in the measuring and pricing of the building and allied trades, in final accounts and adjustment of contracts.

Commencing salaries up to £1,400 for Quantity Surveyors and up to £1,120 for Assistants.

Subject to completion of a Bond to remain in the Service for three years, successful applicants will be assisted with expenses incurred in travelling to New Zealand. A superannuation scheme is available and there are generous annual and sick leave privileges.

Enquiries mentioning this publication, quoting reference number B11/30/23 and indicating the position sought, should be addressed to The High Commissioner for New Zealand, 415 Strand, London W.C.2. Full details of housing available, fares payable, career prospects, type of work, terms of contract, local conditions and application forms will then be supplied.

(S 429)

ELECTRICAL DEVELOPMENT ENGINEER

With experience in design and testing of Transformers and Battery Charging equipment.

ELECTRICAL DEVELOPMENT ENGINEER

With experience in design and testing I.V. Control Gear.

These vacancies are due to the expansion programme of Britain's Leading Fork Truck Manufacturer, whose factory is situated on the outskirts of a pleasant country town, one hour west of London.

Apply in first instance with full particulars to:

J. Dewar,
Personnel Manager,
Lansing Bagnall Ltd.,
Kingsclere Road, Basingstoke,
Hants.

(S 378)

SALES ENGINEER. Applications are invited from candidates of H.N.C. standard and with sales experience of H.V. and L.V. switchgear, variable speed drives, and rectifiers for our Ipswich Office staff. The appointment is pensionable and a Company car will be provided. Write in strict confidence to The Manager, Lancashire Dynamo Group Sales Ltd., 12 Princes St, Ipswich, giving details of age, education and training, qualifications and experience. (S 422)

SAO PAULO LIGHT S.A.—SERVICOS DE ELETRICIDADE, a Company in Brazil and a subsidiary of the Canadian corporation Brazilian Traction, Light and Power Company Limited, invite applications from suitably qualified men for the position of DEPUTY CHIEF of its PIRATININGA POWER STATION. The power station was completed about five years ago and is situated near Sao Paulo (population over 3 million, temperate climate, 2,200 ft above sea level). The plant comprised initially 2 x 100 MW, 1,800 r.p.m. steam turbo-generator units each supplied at 850 p.s.i., 900°F by one 850,000 lb/hr oil-fired boiler and has been recently expanded by the addition of two 125 MW reheat units, 1,800 p.s.i., 1,000°F. Applicants should have sound technical knowledge and good practical experience in the administration, operation and maintenance of steam-electric power stations; should also be of strong character with an aptitude for supervision and the maintenance of harmonious labour relations. Good salary, three years' agreement with first-class passage both ways; four months' paid leave after three years' service. Written application in the first instance should be made to Mr Osborne Mitchell, General Manager, Canadian-Brazilian Services Ltd., 9-12 Cheapside, London E.C.2. (S 423)

ELECTRICIANS required with first class contracting experience. Long job, good conditions. Write Box ET829., c/o Hanway Hse, Clark's Pl, E.C.2. (S 482)

INSPECTION ENGINEER—ELECTRICAL—required by North East Firm. Applicants should be between 25 and 40 years of age and be prepared to travel. Minimum qualification O.N.C. and preferably with some inspecting experience. Please reply to Box No. 8051, Electrical Times, giving essential data and salary required. (S 355)

INSPECTION ELECTRICAL ENGINEER required for London Area. Applicants should be between 25 and 40 years of age with minimum qualification O.N.C. and with inspection experience. Reply to Box No. 8049, Electrical Times, giving essential data and salary required. (S 354)

INSPECTION ELECTRICAL ENGINEER required for Manchester area. Applicants should be between 25 and 40 years of age with minimum qualification O.N.C. and with some inspection experience. Reply to Box No. 8047, Electrical Times, giving essential data and salary required. (S 352)

REQUIRED for Polyphase Test Department: EXPERIENCED TESTERS OR IMPROVERS. These vacancies afford unique opportunity for experience on calibration of a wide range of integrating electricity meters and ancillary equipment. Staff status after qualifying period. Please enquire, Personnel Manager, Landis and Gyr, Ltd., Victoria Rd, North Acton, W.3. (S 398)

REPRESENTATIVE required for a firm of London Wholesalers, experienced and with good connections. Only men who can produce results need apply. This is a unique opportunity for the right man.—Box No. 8055, Electrical Times. (S 392)

Electrical Development Engineer

required by

F. PERKINS LTD., DIESEL ENGINE MANUFACTURERS

Applicants should be of H.N.C. standard or G.I.E.E. and should have experience in the design, development and use of special purpose instruments. A good general knowledge of internal combustion engines is desirable.

The main functions will be the development of electronic and electrical instruments for use on High Speed Diesel Engines.

We offer good salary, three weeks' holidays and modern welfare facilities.

Applications should be made in writing to Staff Officer, Eastfield Factory, Peterborough, giving details of age, experience, etc., and salary expected. (S 434)

JAMES BOOTH ALUMINIUM LIMITED

ELECTRICAL DRAUGHTSMAN

required in Birmingham for electrical layouts and schematic drawings. O.N.C. or better qualifications essential. Salary according to qualifications and experience.

Write: Enginering Director, James Booth Aluminium Ltd., Argyle St, Works, Birmingham 7.

Interviews on a Saturday morning can be arranged if desired.

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THE Bowater Organisation. Applications are invited from suitably qualified men under the age of 40 years for the positions of SHIFT ELECTRICAL FOREMEN. Successful applicants will be responsible for the maintenance of electrical equipment covering power generation, distribution and utilisation in a large paper manufacturing plant.

These are permanent staff appointments necessitating three-shift working. A contributory Superannuation Fund including provisions for Life Assurance and Widows' Pensions is operated by the Company.

Applicants are invited to write in confidence giving details of age, training, qualifications and experience to the Chief Engineer, Bowaters United Kingdom Pulp and Paper Mills Limited, Thames Division, Northfleet, Kent. (S 452)

FOR SALE

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co. Ltd., Honeypot La, Stanmore, Middx. Edgware 5566/9. (S 4)

A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI 5105, 67 Rothschild Rd, W.4. (S 3)

A.C. and D.C. SLOTMETERS: Time Switches and Quarterly Meters. Single and polyphase, 2½—100 amps. Tested and guaranteed 2 years. Television and Billiards Meters. — Tradex Meter Co., Surbiton. Elmbridge 2234/5/6. (S 9)

ELECTRIC MOTORS, D.C. and A.C. Motor Generator Sets, Alternators and Dynamos, Diesel Sets, Circuit-breakers, Switchboards, reconditioned and guaranteed. Very large stocks held.—Britannia Manufacturing Co. Ltd., Britannia Walk, N.1. CLErkenwell 5512/3/4. Stores at Chobham, Surrey. (S 7)

HOUSE-SERVICE METERS, A.C. or D.C., quarterly or prepayment.—Universal Electrical, 221 City Rd, London, E.C.1. (S 5)

HOUSE-SERVICE METERS, all types can be obtained by return from Selectrics, Dept. E.T., Meter Hse, Factory Row, Castle Circus, Torquay. Phone 7218. (S 8)

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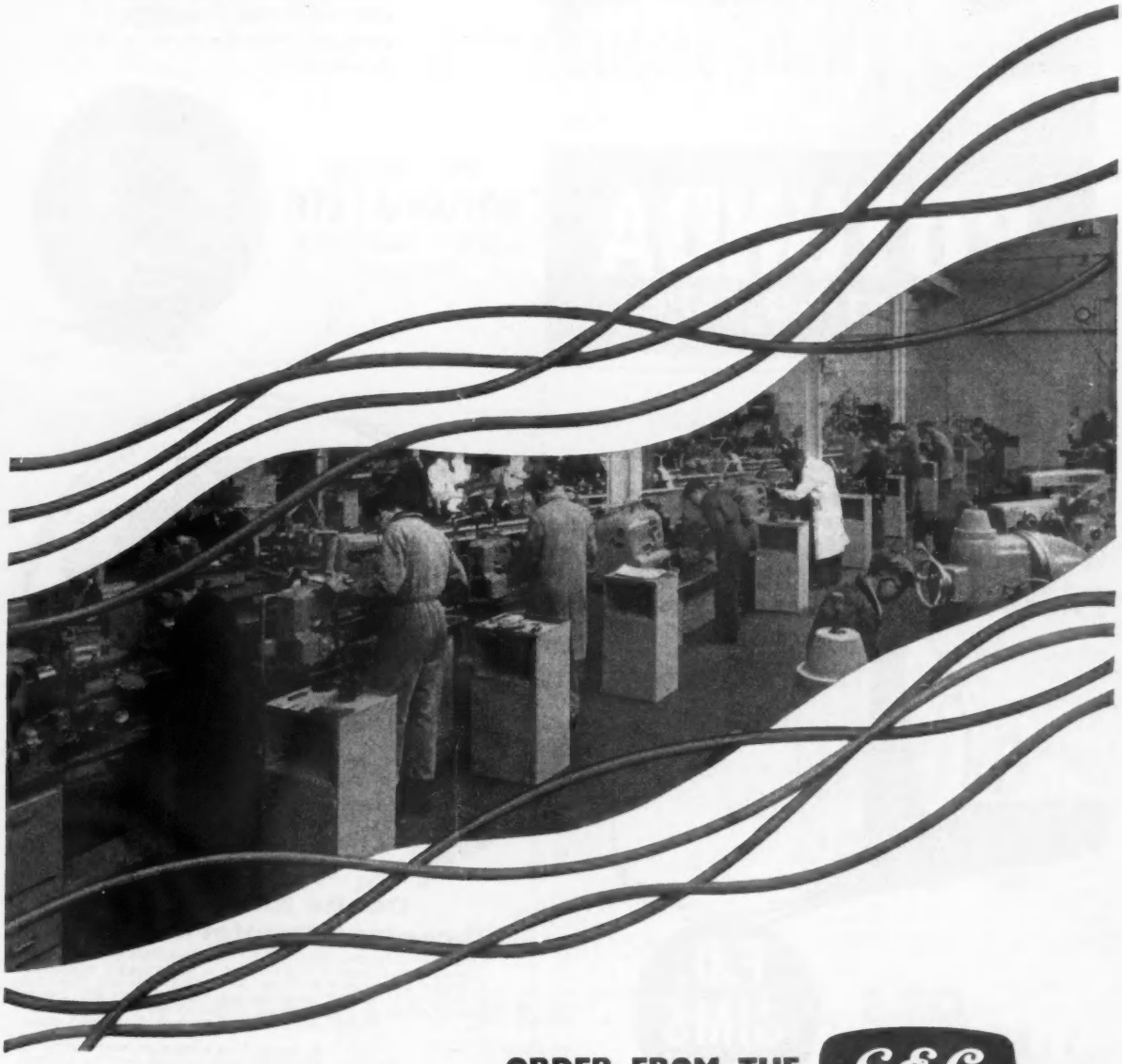

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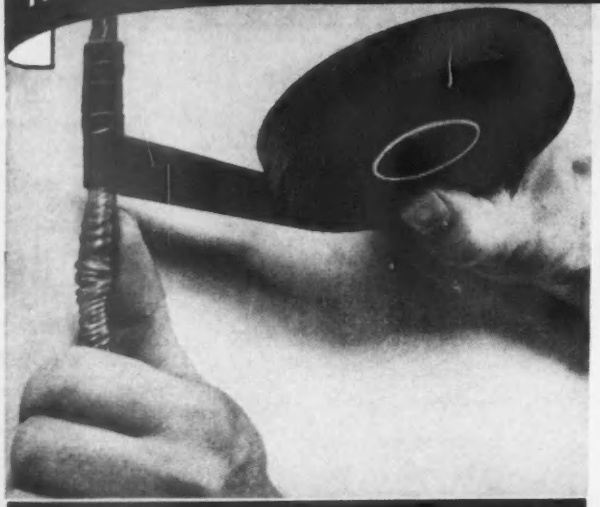

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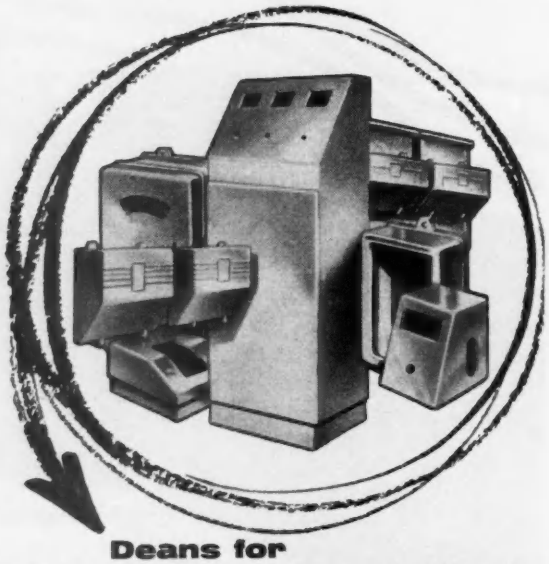

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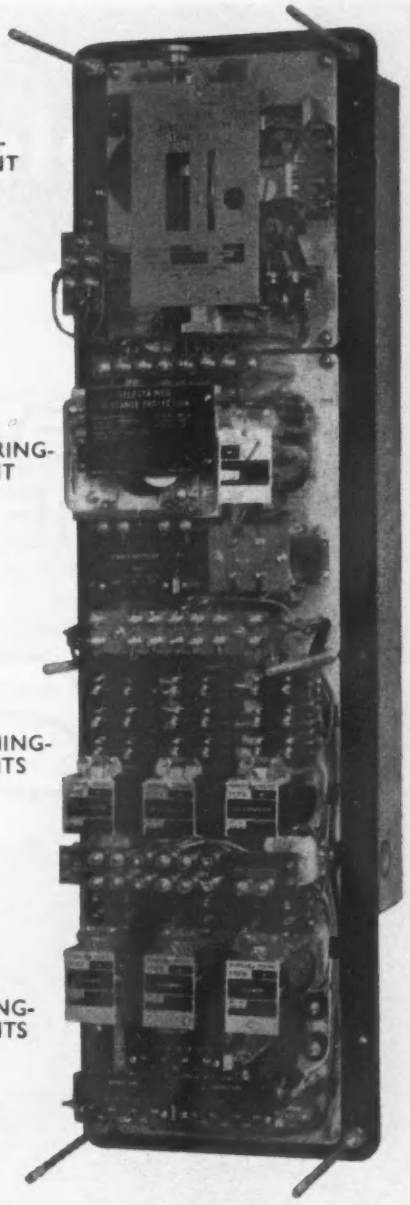

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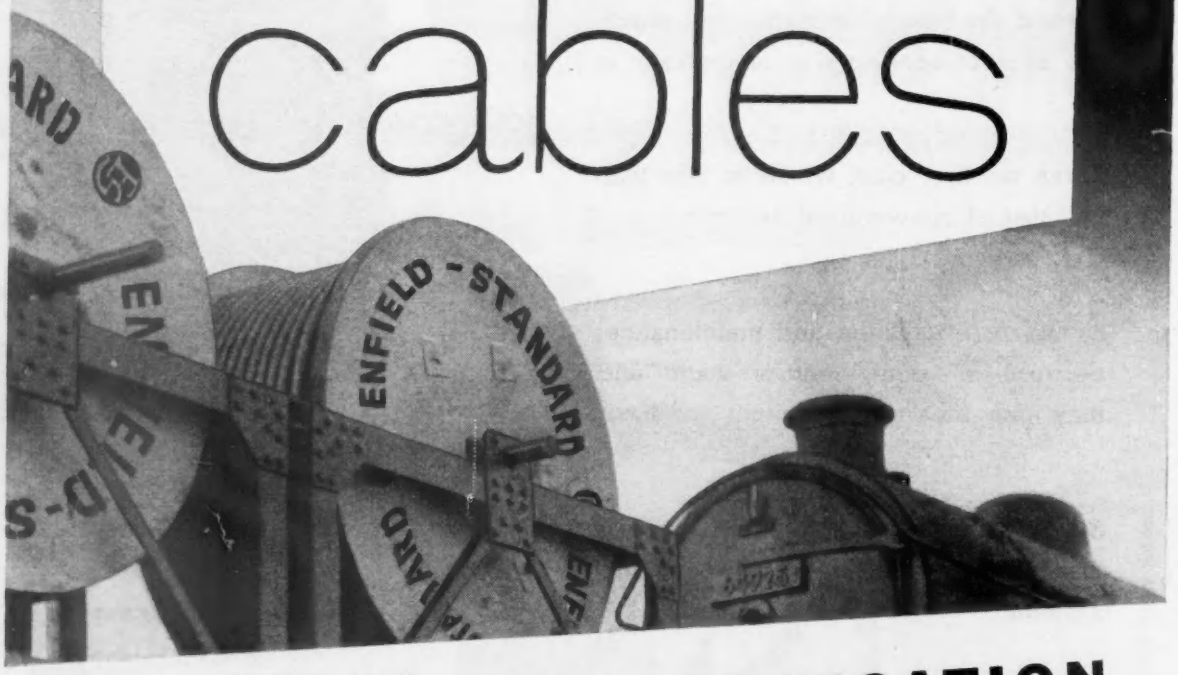

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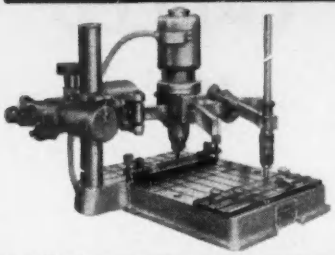

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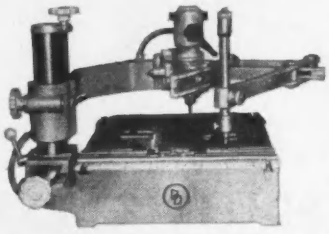

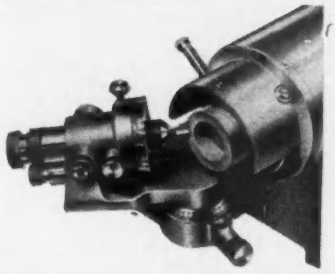

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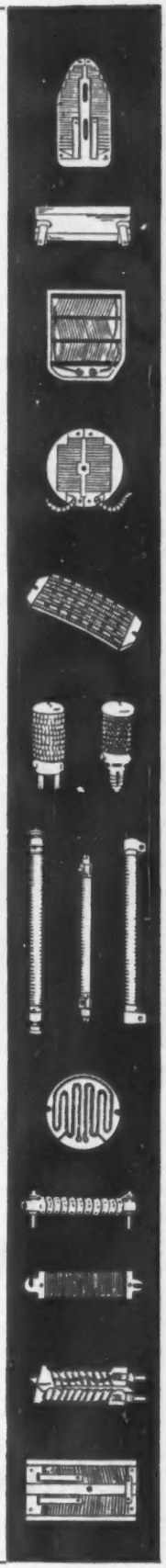

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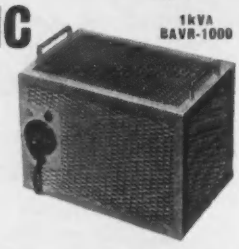

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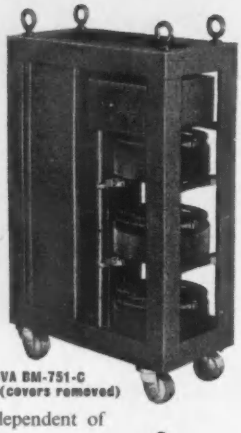

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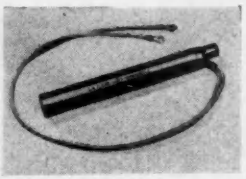

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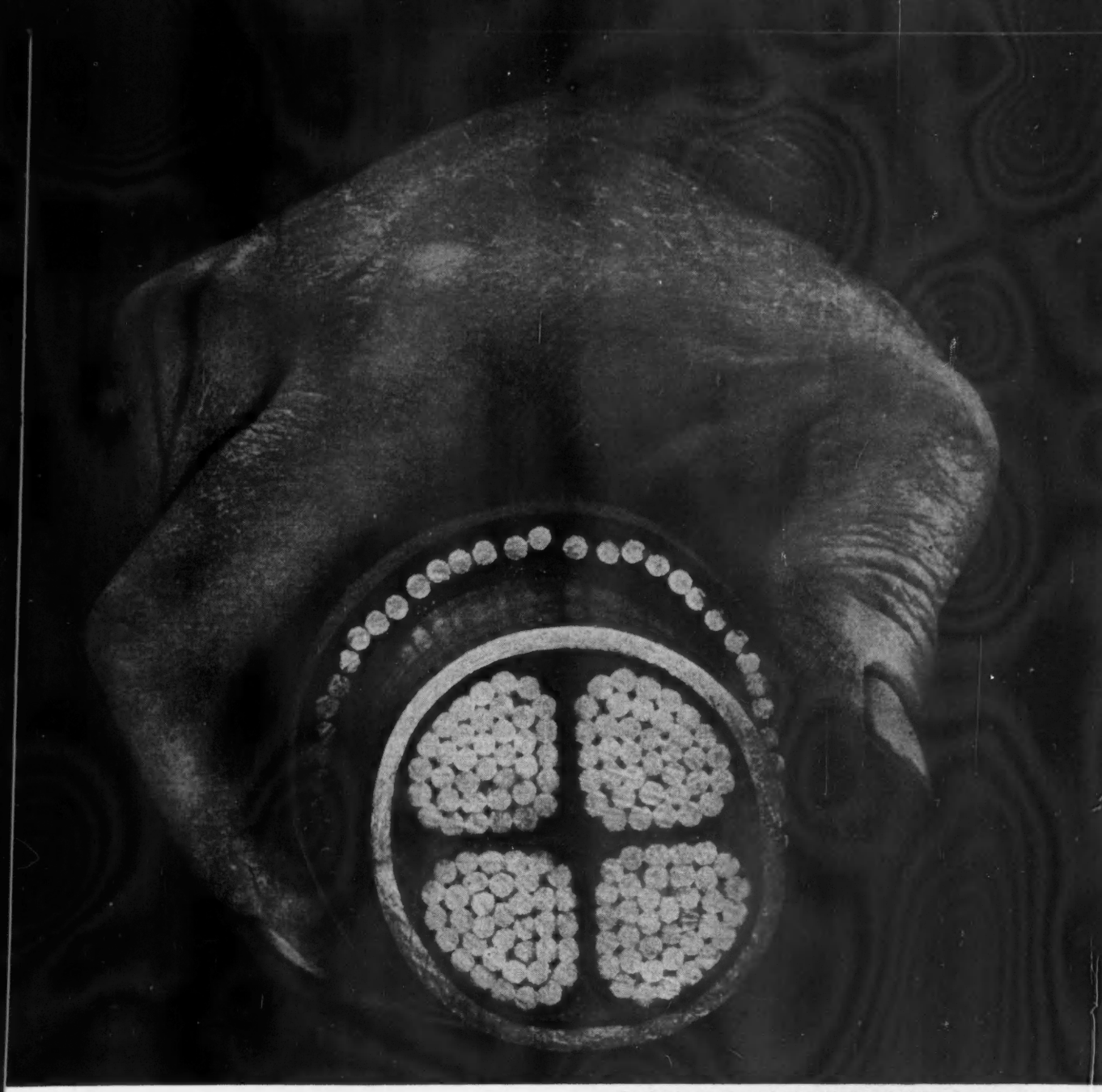

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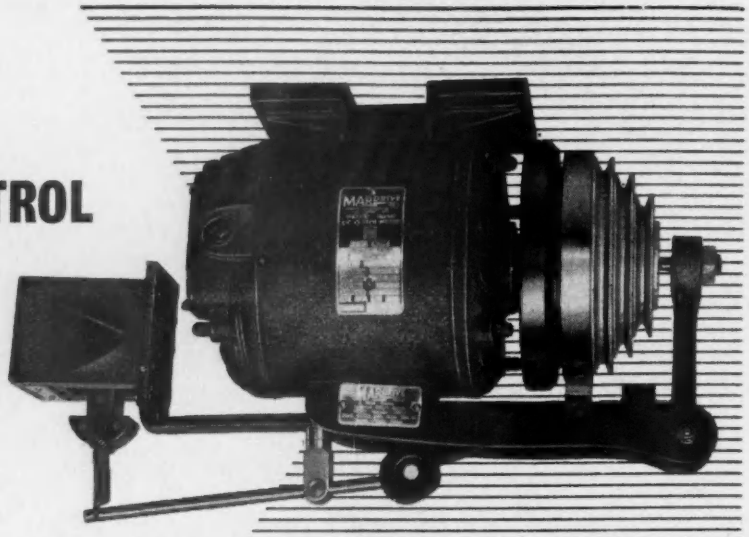

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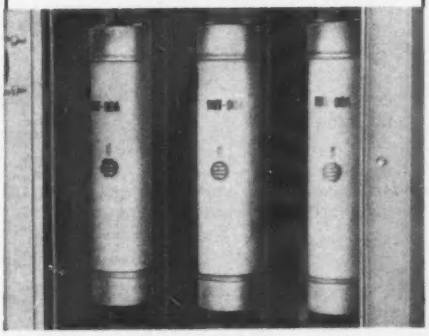

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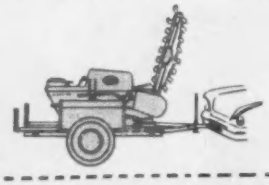

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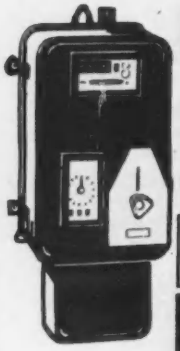

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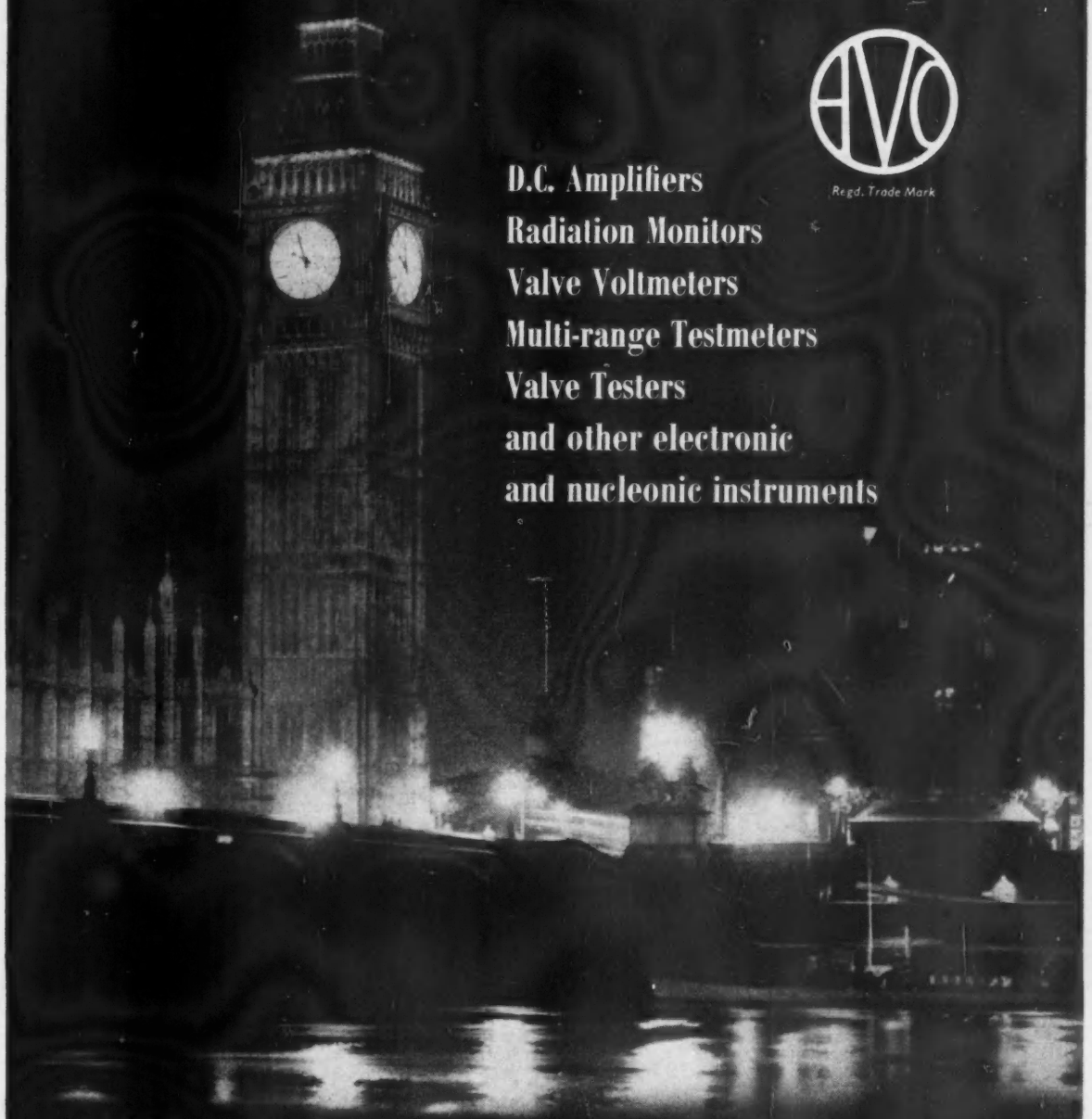

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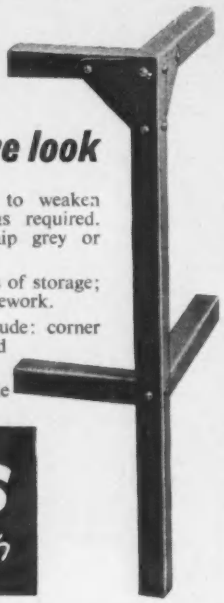

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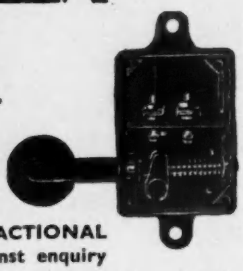

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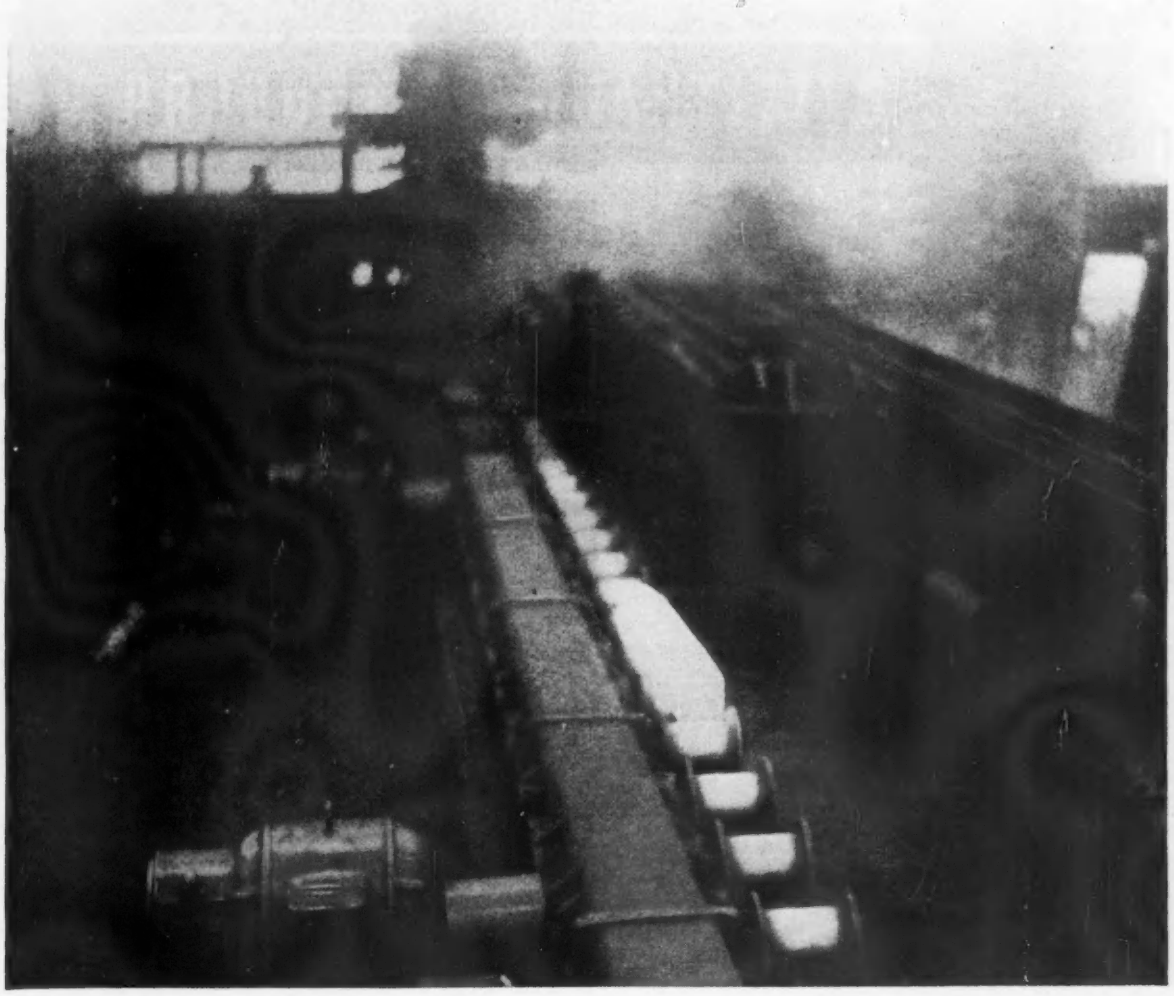

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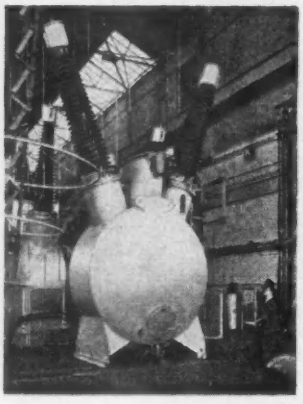

The illustrations show a complete 330 kV. bushing insulator and a 330 kV. circuit breaker, by courtesy of the AEI Ltd.

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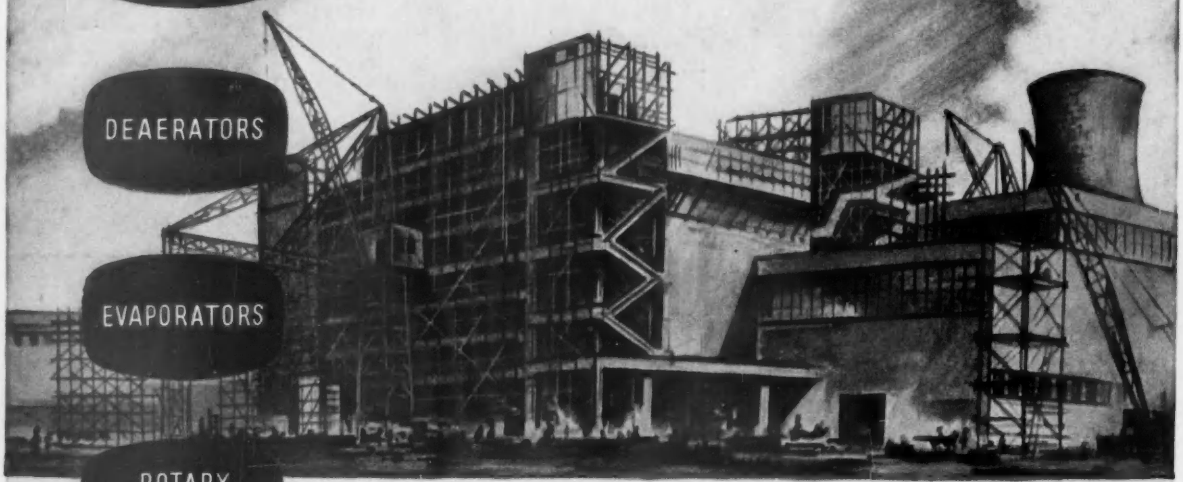

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